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THIRTY-FOURTH ANNUAL REPORT
OF THE
SECRETARY
OF THE
STATE BOARD OF HEALTH
OF THE
STATE OF MICHIGAN
FOR THE
FISCAL YEAR ENDING JUNE 30, 1906.



BY AUTHORITY

LANSING, MICHIGAN
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1907

OFFICE OF THE
SECRETARY OF THE STATE BOARD OF HEALTH,
LANSING, MICHIGAN, JUNE, 1907.

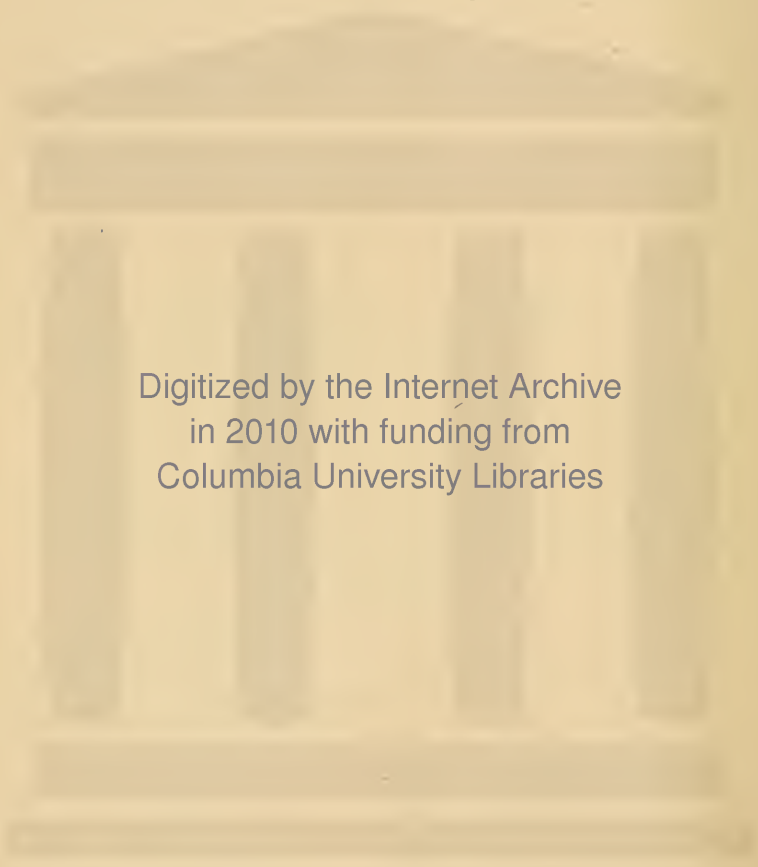
TO HON. FRED M. WARNER, *Governor of Michigan:*

SIR:—In compliance with the laws of this State, I present to you the accompanying report for the fiscal year ending June 30, 1906.

Very respectfully,

FRANK W. SHUMWAY,

Secretary of the State Board of Health.



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MEMBERS
OF THE
MICHIGAN STATE BOARD OF HEALTH.

NAME.	POSTOFFICE ADDRESS.	TERM EXPIRES.
VICTOR C. VAUGHAN, M. D., Ph. D.	Ann Arbor	January 31, 1907
AARON R. WHEELER, M. D.	St. Louis	January 31, 1907
CHARLES M. RANGER, A. B.	Battle Creek	January 31, 1909
HON. COLEMAN C. VAUGHAN	St. Johns	January 31, 1909
ANGUS McLEAN, M. D.	Detroit	January 31, 1911
MALCOLM C. SINCLAIR, M. D.	Grand Rapids	January 31, 1911
FRANK W. SHUMWAY, M. D.	Lansing	March 30, 1911

PRESIDENT,
VICTOR C. VAUGHAN, M. D.

VICE PRESIDENT,
ANGUS McLEAN, M. D.

SECRETARY AND EXECUTIVE OFFICER,
FRANK W. SHUMWAY, M. D.

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REGULAR AND SPECIAL MEETINGS OF THE STATE BOARD OF HEALTH, FISCAL YEAR, 1906.

BRIEF EXTRACTS FROM THE PROCEEDINGS.

ADJOURNED REGULAR MEETING, HELD AT GRAND RAPIDS, JULY 21, 1905.

The members present were: Victor C. Vaughan, M. D., President; Dr. M. C. Sinclair, Dr. Angus McLean, Charles M. Ranger and Frank W. Shumway, M. D., Secretary.

The following communication from the Pennsylvania State Board of Health, relative to the death of the Hon. Frank Wells, was read and ordered printed in the proceedings of this Board:

*Commonwealth of Pennsylvania
State Board of Health.*

Philadelphia, May 12th, 1905.

Dr. Frank W. Shumway,
Secretary State Board of Health,
Lansing, Mich.

SIR: I am instructed by the State Board of Health and Vital Statistics of the Commonwealth of Pennsylvania, to transmit to your honorable body a copy of the following resolution adopted at a regular meeting held at Harrisburg, Pa., May 11, 1905.

Very respectfully,

BENJAMIN LEE,

Secretary and Executive Officer.

WHEREAS, The State Board of Health of Pennsylvania, has learned with deep regret of the death of Mr. Frank Wells, who for so long a period has held the honorable and responsible position of President of the State Board of Health of Michigan; therefore

Resolved, That this Board desires to express its appreciation of the long continued faithful and intelligent support given by Mr. Wells to the cause of sanitary reform and advancement, not only in his own State, but throughout the entire continent of North America.

Resolved, That the Secretary transmit this minute to the President and Board of Health of Michigan, with an expression of sympathy with that Board in their sad loss.

The chairman instructed the Secretary to record the communication from the Pennsylvania State Board of Health on the death of Hon. Frank Wells in the printed proceedings of the Board, and to send a copy of the resolutions to the family of the deceased; also a letter of acknowledgment to the secretary of the State Board of Health of Pennsylvania.

The report of the Sanitary Engineer of this Department on the proposed new heating plant, and the remodeling of the heating of the Training School building, at the Central State Normal School, Mt. Pleasant, was accepted and adopted by the Board. (A copy of this report is printed on a subsequent page of this annual report, under the heading "Examination of plans for State Buildings," etc.)

The Secretary announced to the members present the appointment of J. E. McDonald, as Deputy Secretary of the State Board of Health.

SPECIAL MEETING, HELD AT LANSING, NOVEMBER 15, 1905.

The only members present were Charles M. Ranger and Frank W. Shumway, Secretary.

Thirty-three applicants for embalmers' license were examined and licenses were subsequently granted to fifteen of the applicants.

REGULAR MEETING, HELD AT LANSING, OCTOBER 13, 1905.

The members present were: Dr. Victor C. Vaughan, President; Charles M. Ranger, Dr. Angus McLean, Dr. Aaron R. Wheeler, and Dr. Frank W. Shumway, Secretary.

The Secretary submitted a written report of his investigation of the epidemic of typhoid fever at Alma, which was accepted. (A copy of this report is printed in a subsequent portion of this report under the heading, "Typhoid fever in Michigan in 1905 and preceding years.")

Mr. Ranger, who was a delegate at the Joint Conference of Embalmers' Examining Boards and State Boards of Health, held at Niagara Falls, October 9 and 10, 1905, reported verbally on his attendance at that meeting. He stated that fourteen States were represented at the meeting, and that uniform rules of transportation, reciprocity between States, and methods adopted by the various States in securing the enforcement of the law, were among the subjects discussed. In the matter of securing the enforcement of the license law, in some instances cited, examining boards had been able to deal quite successfully with the subject by dividing the State into districts and appointing in each district a licensed embalmer whose duty it is to report violations of the law in his district and obtain sufficient facts against violators of the law to secure prosecution. No reciprocity rules were adopted by the conference on account of the lack of uniformity of requirements of the different States.

Subsequent to Mr. Ranger's report, letters were read from licensed embalmers in other States asking that they be admitted to practice in Michigan without being required to take the usual examination, but, as stated by Mr. Ranger in the report just mentioned, owing to the lack of uniformity in the requirements of different States, there are no reciprocal rules between the different States and therefore this Board voted not to admit licensed embalmers from other States to practice in this State until they pass the regular examination and pay the regular fee.

The reports of the Sanitary Engineer of this Department on the examinations of plans for the following State Buildings were approved by the Board:

New Dormitory at the Michigan Agricultural College.

Additions to the Northern State Normal School, Marquette.

Detached building for patients at the Eastern Michigan Asylum, Pontiac.

New Cottage "L." for the Upper Peninsula Hospital for Insane, at Newberry.

New hospital for the Michigan Soldiers' Home, Grand Rapids.

(Copies of these reports may be found on subsequent pages of this annual report, under the heading "Examination of plans for State buildings.")

REGULAR MEETING, HELD AT LANSING, JANUARY 12, 1906.

The members present were: Dr. V. C. Vaughan, President; Charles M. Ranger, A. B., Angus McLean, M. D., Malcolm C. Sinclair, M. D., and Frank W. Shumway, Secretary.

Secretary Shumway submitted to the board a letter from Professor Delos Fall, ex-member of the board, on the analysis of spring waters for the determination of a chlorine standard in uncontaminated spring waters of the State. The purpose of the letter was to enlist the interest and co-operation of this board in Professor Fall's work. Dr. Vaughan suggested that while the data gathered by Professor Fall in the work of these analyses would be valuable, still there might arise misunderstanding among the citizens of our State as to the meaning of this data. For instance, a water source might have the minimum percentage of chlorine, thus indicating that it be a pure water supply; whereas other and further analysis prove that it be a contaminated source. Therefore, the data obtained by Prof. Fall will be of use in determining the purity of waters, only in connection with other data. President Vaughan further said that at some future time, this data, together with other data obtained at the Laboratory of Hygiene at Ann Arbor, might prove of great use to this board in the determination of the purity of water supplies. This was in answer to Dr. Sinclair's question: of what use would the data gathered by Professor Fall be to the local health officers throughout the State.

On motion of Mr. Ranger, the board set apart a sum not to exceed fifty dollars, to aid Prof. Fall in his investigations in the work he has outlined in his letters.

A committee, consisting of Doctors Vaughan, Sinclair and Shumway, was appointed to cooperate with similar committees from the State Engineering Society and the State Medical Society, in an endeavor to secure legislation at the next legislative session along the line of public water supplies. The subject of State control of public water supplies was discussed quite thoroughly, and it was the opinion of the members present that some form of state control, in the nature of a special commission, or by enlarging the powers of the State Board of Health, was necessary and desirable.* It was suggested that the functions of such commission or board should be:

1. To see that the supply is adequate.
2. To see that the method of purification is according to the standard.
3. To see that the source is free from contamination.

A discussion relative to the best way to discriminate between diseases to be reported and placarded and those to be reported and restricted resulted in the adoption of a motion that influenza, measles, whooping-cough, r  theln, chicken-pox, puerperal fever and erysipelas be required to be reported and placarded.

REGULAR MEETING, HELD AT LANSING, APRIL 13, 1906.

The members present were: Dr. V. C. Vaughan, President; Charles M. Ranger, Dr. Aaron R. Wheeler, and Dr. F. W. Shumway, Secretary.

There was no business of special importance to the public, the time of the members being taken up in the consideration of routine business and violations of the law relative to the embalming of dead bodies.

*A paper on a "Proposed State Supervision of Water Supplies and Methods of Disposal of Excreta in Michigan," by Frank W. Shumway, M. D., Secretary of the Board, is printed on a subsequent page of this Report.

EXAMINATION OF PLANS FOR STATE BUILDINGS, RELATIVE TO SEWERAGE, VENTILATION AND HEATING, DURING THE FISCAL YEAR ENDING JUNE 30, 1906.

The following are reports upon the examinations of the plans submitted to the board during the fiscal year, in accordance with Section 2229, Compiled Laws of 1897:

NEW HEATING AND LIGHTING PLANT, AND THE REMODELING OF THE HEATING OF THE TRAINING SCHOOL BUILDING, AT THE CENTRAL STATE NORMAL SCHOOL, MT. PLEASANT.

No person was present to explain the plans, but prior to this meeting E. W. Arnold, the architect, called at the office of the Secretary of the Board and explained the plans.

The plans contemplate the erection of a new boiler house and power plant, nearly midway between and east of the present buildings, for the heating and lighting of the buildings, the steam pipes, electric light wires, etc., to be carried to the buildings in underground tunnels; also the installation of a fan and heating coils in the Training School Building to take the place of the present heating system.

No provision seems to have been made for changing the present improper method of terminating the vitiated-air flues from a number of rooms in the Training School Building, and it is recommended that each of the flues be continued separately from the points where they now terminate in the attic to a point above the roof.

It was stated by the architect that two openings in the floor of the vestibule numbered "one" on the first floor plans might be used to supply air to the fan when it became necessary to warm the building quickly. This is not approved for the reason that these openings would be receptacles for dust, and dirt from sweeping and from the shoes of persons passing over them, and might become receptacles for sputa, possibly from some person suffering from pulmonary trouble. It is recommended that the air supply for this building be entirely and directly from outside the building.

The location of the fresh-air inlet for the new drainage of the boiler house is considered not good, for the reason that when the closet is flushed foul air will probably be forced out of the fresh-air opening in the vicinity of a window. It is recommended that this opening be placed where it will be impossible for air from the drain to enter the building.

In the plan numbered "five" is shown "Bell" traps for the floor drains, and in the plan numbered "seven" the floor drain is shown to consist of a "P" trap surmounted by a "Bell" trap. It is recommended that "Bell" traps be not used for the reason that they do not permit of the free and rapid flow of water through them and become easily clogged by dirt, and when the covers are raised to remove stoppages or allow water to flow away more quickly they are liable to be left off and become broken, and when the covers are off dirt can enter the drain. All openings for the removal of surface water from the floors of this building should consist of a catch-basin to keep cinders and coal out of the drain, the trap being formed by turning the end

of the branch drain down into the catch-basin a sufficient distance to form a good seal.

The drain from the pump and tank room is shown to connect at a right angle with the branch drain under the boiler room. This is not approved and it is recommended that the connection be through a "Y" fitting.

With the exceptions before-mentioned, the plans were approved, in so far as this board is required by law to examine and express an opinion.

ADDITIONS TO THE NORTHERN STATE NORMAL SCHOOL, MARQUETTE.

No person was present to examine the plans, but previous to the meeting, E. W. Arnold, the architect, called at the office of the Secretary of the Board and explained the proposed additions.

The plans contemplate the erection of a one story and basement addition, or wing, to the Peter White Science Building, the first floor to be used for class rooms and girls' toilet, and the basement for a gymnasium. It is also proposed to construct in the basement of the Peter White Science Building a Directors' room, and Boys' and Girls' Bath and Locker rooms, for use in connection with the new gymnasium.

By reason of the limited heights of the vent flues on the first floor, and the fact that, until further contemplated changes are made, one vent stack must be on an outer wall, and be subject to the cooling action of the outdoor air, it is presumed that it will be difficult at all times to maintain a sufficient velocity in these flues to properly ventilate the rooms. To accelerate the draft in these flues, whenever necessary, it was recommended that steam coils, of sufficient areas, be placed in the flues.

The plans do not show any provision for the ventilation of the Directors' room or the Boys' Bath and Locker room, and it was recommended that provision be made for the thorough ventilation of these rooms.

The area and height of the "Old Vent" in the Girls' Bath and Locker room are not shown on the plans, and it is therefore impossible to determine the amount of air which the vent will remove. Locker accommodation has been provided for a large number of girls, and it is presumed the room will be occupied by a considerable number of girls at one time. Judging from the scale to which the plans are drawn, the vent would seem to be too small for the proper ventilation of this room, and it was recommended that if, upon test, the vent is found to be too small, an additional vent be provided.

With the exceptions before-mentioned, the plans were approved, in so far as this board is required by law to examine and express an opinion.

NEW HOSPITAL BUILDING FOR THE MICHIGAN SOLDIERS' HOME, GRAND RAPIDS.

No person was present to explain the plans, but previous to the meeting, Louis Kanitz, a member of the Board of Managers, called at the office of the Secretary of this Board and explained the general arrangements of the proposed work.

The following extracts from a recent letter received from the architects, Osgood & Osgood, Grand Rapids, explain some details not shown on the plans:

"Vent ducts from the end pavilions discharge the foul air directly into the unfinished attic. Now, instead of running ducts from these vents to general openings, we thought it best to place on the roof at these points large ventilators of the Star or Globe make, two at each end, which are of sufficient capacity to draw off all foul air as fast as it can be delivered.

"The center section of foul air ducts is connected to the ventilator on the roof, central section. This connection is made above the ceiling line of 4th floor, the attic space at this point being small, hence the connection.

"The amount of fresh air, size of openings, both incoming and outgoing, are based upon the capacity of each ward or room, and are so proportioned that the air passing through the lungs of one person will not pass through the lungs of another."

The method of basing the sizes of the fresh-air and vent flues upon the capacity of a room is not good if by "capacity" is meant the cubic contents, or available air space, of the room. In the past, this Board has recommended a minimum of 2,000 cubic feet of fresh air per hour for each occupant, irrespective of the sizes of the rooms, and it is generally understood that for a hospital building at least 3,000 cubic feet per hour for each person should be provided.

The basement plan shows seven air chambers, four of which are shown to be connected with the outer air by twenty-four inch stoneware pipes, but there does not appear to be any provision for doors to these chambers to prevent the fresh air mixing with that in the hallways. Four pipes, similar to those leading to the air chambers, are shown to be near to the pipe conduits, and it is presumed the plans contemplate the use of the entire hallways as a fresh-air chamber. As there will be travel through the main hallway to the Wine Cellar, Morgue, Elevator and Clothes Chutes, its use as a fresh-air chamber is considered objectionable. If the hallways are to be so used, they should be made impervious to air from any other source than the special inlets which convey the fresh air from outside the building; the entrances to them kept under lock and key, and accessible only to the person having charge of the heating apparatus; and access to the Wine Cellar, Morgue, Elevator and Clothes Chutes be from outside the building only, the proposed entrances to these rooms from the hallways being walled up. The alternative to the foregoing suggested changes in the plans would be to make each air chamber secure against the entrance of air from the hallways, and conduct the fresh air to each chamber in air-tight pipes.

No provision, other than what would be effected by open doors, special openings in the bottom rails of some of the doors, transoms or windows, seems to have been made for the ventilation of a number of toilet rooms, those rooms set apart for the employees of the building, the waiting rooms on the first floor, and several ward rooms on the third floor. This is not approved, because the ventilation of the rooms in question will not be sufficient, and the ventilation of the toilet rooms into the corridors would contaminate air which is intended for the use of the occupants of rooms for which no special ventilation has been provided. It is recommended that each occupied room be provided with ample ventilation, and that a vent flue be provided for each toilet room, and carried separately to the outer air above the roof.

The proposed method of discharging the air from a number of flues into the attic is considered not good, and it is recommended that each vent flue have a separate outlet above the roof.

With the exceptions before-mentioned, the plans were approved, in so far as this board is required by law to examine and express an opinion.

NEW DETACHED BUILDING FOR PATIENTS, AT THE EASTERN MICHIGAN ASYLUM,
PONTIAC.

A description of the proposed building is contained in the following copy of a letter received from E. A. Christian, M. D., the Medical Superintendent:

"Purposes of the building.—The building is for the care of 100 infirm women, some of them bedridden, all of them more or less helpless and requiring careful personal attention.

"The general character and arrangement of the building.—The building contemplated is a two-story building with basement and attic. In order to best care for the class of patients described above, each floor consists mainly of one large ward and day room combined. The only single rooms in connection with the building are for nurses and other help. Connected with each floor is a wide veranda on the south and east front. The veranda of the upper floor will be protected by the usual woven-wire guards.

"Food Arrangements.—The slope of the land permits of a basement kitchen, in which food will be prepared for the two wards above. Connected with each ward is a dining-room.

"Stairways.—There are two means of exit from each floor, one at either end of the building. The stairway at the east end is entirely without the building and separated from the wards by a fire-wall.

"Heating.—The building will be heated from the main heating-plant. There will be 3,900 feet of indirect radiating surface, furnished by radiators of the Gold pin type. In addition to this, there will be 368 feet of direct radiation on the first and second floors. These direct radiators will be in rooms for help. The indirect radiators will be placed in the basement. Heat will be carried from them to the wards above by flues 8 inches by 12 inches in size. These flues will open upon the ward eight feet above the floors, and will be supplied with 12 inch by 18 inch slat registers for controlling the heat. All the flues are in the inside walls. The entire basement with the exception of the kitchen wing and bathroom annex will be used as plenum for heating and ventilation.

"Ventilation.—The floor space allowed per patient in each day room and dormitory is 87 square feet. The cubic feet of air-space allowed per patient is 1,131 feet. Fresh air will be supplied to the radiators in the basement from windows opened according to the direction of the wind, according to the plan successfully in use for many years in all parts of this asylum. All ventilating-flues are to be 8 in. x 8 in., built within the inside walls. Foul-air flues start from the floors and terminate in the attic, four inches above the attic floor, from which point they will be connected by galvanized-iron pipes to ventilators in the ridges, each 20 inches in diameter, of the globe-type pattern. Ventilation from each floor will be carried separately to the outside. This is also true of the ventilation from each bathroom and water-closet.

"Plumbing.—There will be two water-closet stools, two shower-baths and one bathtub on each floor. All sewer pipe within the building, and to a point five feet outside of walls, will be of 6-inch castiron extra heavy soil pipe. From house side of main sewer-trap a six-inch extra heavy castiron fresh-air inlet pipe will be carried to a point five feet above grade outside of wall, and from that point will be continued to four feet above the roof, with a six-inch spiral pipe of galvanized iron. Soil pipe stack will be located in a pipe-shaft, and from the basement floor to four feet above the roof will be of six-inch extra heavy castiron soil-pipe. All closets and other fixtures will be connected to the soil-pipe stack, with lead bends and brass ferrules, the latter to be wiped joints and not soldered to bends. The sinks in the kitchen and dining-rooms will have a three inch extra heavy castiron vent-pipe carried to a point four feet above the roof. The tile, drains and the storm water from the roofs will not connect with the sewers, but will be led to a drain running from the main boiler-room, which carries no sewerage."

The plans show a clothes chute opening into a part of the basement which will be used as a fresh-air chamber. This is not approved. It is recommended that the clothes chute open into the toilet room, and that the entire space used as a plenum chamber be kept under lock and key, accessible only to the person having charge of the heating apparatus, and every precaution taken, by plastered ceilings, cement floors, etc., to prevent contamination of the air supply in its passage through the basement rooms.

The proposed method of controlling the heat in rooms by slat registers is not approved, for the reason that the closing of the slats will curtail or cut off the fresh air supply. The temperature of the air in the rooms should be controlled in the basement, and in such a manner that the volumes of fresh air will remain constant.

The combined areas of the eleven main ventilators shown on the plans is considerably less than the combined areas of the vent flues to be connected with them, and it is recommended that the ventilators be enlarged and partitions made in them corresponding in size and number with the flues connected with them, and thus obtain a *separate* outlet for each flue above the roof.

With the exceptions before-mentioned, the plans were approved, in so far as this board is required by law to examine and express an opinion.

NEW COTTAGE "L." FOR THE UPPER PENINSULA HOSPITAL FOR THE INSANE,
NEWBERRY.

No person was present to explain the plans, but previous to the meeting, Dr. E. H. Campbell, Medical Superintendent, and D. Fred Charlton, the architect, called at the office of the Secretary of the Board, and explained the proposed work.

The plans contemplate the erection of a cottage building substantially the same as other cottages at this institution, plans for which were examined and approved by this board on March 7, 1900; July 12, 1901; and on July 17, 1903.

As in the case of some of the plans previously submitted, the plans for Cottage "L." show a soil pipe and drain passing through a portion of the basement which is to be used as a fresh-air chamber. This was considered a serious objection because by reason of a leak in the pipes, or during alterations or repairs, the air supply of the entire building would probably be contaminated by sewer air. It was recommended that that portion of the basement where the pipes are to be located be securely walled off, and that entrance to this space be from outside the building only.

With this exception, the plans were approved, in so far as this board is required by law to examine and express an opinion.

NEW DORMITORY BUILDING AT THE MICHIGAN AGRICULTURAL COLLEGE.

No person was present to examine the plans, but previous to the meeting, E. A. Bowd, the architect, called at the office of the Secretary of this Board and explained the proposed work.

The plans provide for the construction of flues for an indirect system of heating, but a letter from Prof. C. L. Weil, of the M. A. C., dated October 10, a copy of which follows, indicates a change from the plans:—

"At the request of Mr. A. M. Brown, Secretary of the Michigan Agricultural College, I submit the following in regard to the system we propose to employ in heating and ventilating the new dormitory building at the College.

"It is proposed that there shall be installed in the building above noted a system of direct heating with certain modifications. The modifications we have in mind involve a ventilating effect to the extent of utilizing the vent ducts shown on the architect's plans, and, further, providing an increased amount of radiating surface in each room over the amount required normally for direct heating, in order to provide for a direct-indirect effect. The direct-indirect effect would be secured by placing the radiator in each room directly under a window, and either making use of the air from the window directly, or else through an opening, controlled by the sash, under the window stool and apron.

"The system proposed comes within the limit of expenditure which have been indicated to the writer as permissible. Further, I may add that, in my opinion, such a system would be found quite as satisfactory in operation as a combined direct and indirect system, in case the latter is operated in connection with so-called natural draft. A successful and satisfactory combination of direct and indirect systems in the building under consideration could be secured by using fans in connection with the indirect work.

"[Signed]

CHAS. L. WEIL."

The proposition relative to the supply of fresh air to the rooms by open

windows is not approved, because, in very cold weather, and probably at other times, the windows would be closed a considerable portion of the time. It is recommended that sufficient indirect radiation be provided to supply at least 2,000 cubic feet of fresh air per hour for each person at all times.

It is proposed to terminate the vitiated-air flues in the attic by connecting them, in groups, with seven main ventilators on one side of the roof, the combined areas of the 143 flues being about six times greater than the combined areas of the main ventilators. It is recommended that each vent flue be continued, independent of any other flue, to the outer air above the roof. For architectural purposes, and to cut down the expense of a number of large flue stacks, the flues might be connected to a ventilator formed at the ridge, and extending the entire length of the building.

It is scarcely necessary to state that the draft in those vent flues nearest to the outside walls will be affected by the cooling action of the outer air, and it is suggested that accelerating steam coils be placed at the base of each vent flue on the first floor, these being the nearest to the outside walls.

On page 19 of the specifications accompanying the plans it is provided that iron "Bell" traps be used for the removal of water from the floors of some rooms in the basement, and the architect stated that there would be another trap under each "Bell" trap, and that the "Bell" of each trap would be broken off to prevent an air-lock between the traps. This arrangement would be objectionable because the small opening in the outlet of the "Bell" trap would prevent the free flow of a body of water from the floor when the same is flushed, and for the further reason that the lower trap could not be cleaned without removing the "Bell" trap. It is suggested that the connection of the basement drains with the main drain be through a catch-basin, of cement, or brickwork laid in cement, the trap being formed by the outlet being turned down into and near to the bottom of the catch-basin. This arrangement would prevent solid matters from entering the drains, and at the same time furnish a water seal that would not easily become broken by evaporation—a common occurrence in the traps of basement drains. It is understood that the floor drains are to be connected with a storm drain and not with a sewer, but as the air of the storm drain may be foul, or become so, the provision of a trap with a deep seal is desirable.

With the exceptions before-mentioned, the plans were approved in so far as this board is required by law to examine and express an opinion.

NEW MAIN SEWER FOR THE MICHIGAN SOLDIERS' HOME, GRAND RAPIDS.

No person was present to explain the plans, but on December 30 last, upon written requests from Col. George H. Turner, Commandant, and Louis Kanitz, a member of the Board of Managers, T. S. Ainge, of this office, was sent to the Soldiers' Home and examined the plans, explanations relative to the nature of the proposed work being made at that time by T. O. Williams, C. E., who prepared the plans.

The new sewer will discharge into the city sewerage system, instead of into the river, as at present, the connection to be through a large automatic flushing tank, which the city will furnish, for forcing the sewage along a line of sewer with but little inclination.

By reason of the insufficient fall in the city sewer, the amount of fall for the proposed sewer for the Home will necessarily be limited,—about eight and one-half feet in a total length of about 1,950 feet. The upper and great-

er portion of the sewer will have a fall of 1 in 178; the lower portion 1 in 480.

With the large volume of water which will flow through the sewer, especially at those times when the baths are in use, the sewer should be "Self-cleansing."

As a precaution against possible accumulations of solid matters in the lower portion of the sewer, it was recommended that one of the proposed man-holes be built at that point where the change of grade of the sewer is made, and that provision be made in this manhole for damming up and suddenly releasing large bodies of water. The daily flushing of the branch sewers, by a two inch hose, as practiced at the Home, will assist largely in preventing the accumulation of solid matters in any portion of the system.

The plans were approved, in so far as this board is required by law to examine and express an opinion.

NEW SOUTH WING AT THE NORTHERN STATE NORMAL SCHOOL, MARQUETTE.

E. W. Arnold, the architect, was present and explained the plans.

Changes, suggested at that time by the board, relative to the position of the underground sewer, and to the method of terminating the soil and vent pipes in the attic and above the roof, have since been incorporated in the plans, and an amended copy of the plans submitted to the board for final examination.

The plans contemplate the heating and ventilating of the building by the plenum method, with the provision of direct radiation, on outside walls, to supplement the heating done by the fan; and to keep the rooms warm during the nights, and at such times as the fan may not be in motion.

With the exception of the Assembly Room, provision has been made for a change of air in the rooms equal to 2,000 cubic feet per hour for each occupant.

When the proposed main building of this school is erected, it is intended to change the Assembly Room into four class rooms, and the ventilation has been designed with that end in view. The room will be occupied, for assembly, for the space of but forty minutes each day by 200 persons, and the change of air will be equal to 1,500 cubic feet per hour for each person. When the room is partitioned off into four class rooms, the ventilation will then be sufficient to afford about 1,900 cubic feet of fresh air per hour for each occupant. This is based on forty persons occupying each room, as in the case of other class rooms in the building.

The general arrangement of the sewerage and plumbing seems to be in accordance with modern methods, but it is suggested that tests, both during the construction and at completion of the work, be made to determine the soundness of the material and workmanship.

The plans were approved, in so far as this board is required by law to examine and express an opinion.

EXAMINATION AND LICENSING OF EMBALMERS.

Under the provisions of Act No. 132, Laws of 1903, five examinations were held during the fiscal year 1906, as follows:

Iron Mountain, July 8, 1905.

Grand Rapids, July 21, 1905.

Lansing, November 15, 1905.

Battle Creek, February 13, 1906.

Detroit, April 26-27, 1906.

Of the 144 persons examined, 86 were granted licenses and awarded diplomas.

A statement of expenses incurred in the operation of Act No. 132, Laws of 1903, may be found on a subsequent page of this report.

GENERAL WORK, AND EXPENDITURES, IN THE OFFICE OF THE SECRETARY DURING THE FISCAL YEAR, 1906.

Much of the work of the office naturally groups itself under three heads,—the collection of information, the compilation of information so collected, and the dissemination of such information as will be of service in the restriction and prevention of disease.

COLLECTION OF INFORMATION.

As the local health officer is the principal medium by which this Department may reach and instruct the public in matters pertaining to the prevention of sickness and deaths, the appointment, and the return of the names and postoffice addresses of the health officers, in each year, are matters of more than ordinary interest and importance.

In each year, it is often necessary to make a first, second and third request for information which will place this office in communication with the local health officers, and during the time which is thus used up in corresponding and waiting, an outbreak of a dangerous disease may begin and become widespread before this office can afford the usual assistance to the proper officials in the locality.

It should be said, however, that there is an increasing tendency to comply with the law in this particular, and local boards of health now generally act promptly and co-operate cordially with this Department for the suppression of disease.

Having established communication with the newly appointed local health officers, pamphlets and other publications which may aid them in their work, together with the usual blanks for reports of outbreaks of diseases in their locality, are mailed from this Department. In some instances, considerable correspondence is necessary to instruct the health officials how to properly care for sick and infected persons, and to make reports which will be of value in the compilations for the annual reports and other publications of this Department.

DISSEMINATION OF INFORMATION.

PAMPHLET PUBLICATIONS.

As stated in the preceding paragraph, each newly appointed health officer is supplied, by this Department, with information relative to his duties. This information is contained principally in a pamphlet on the "Work of Health Officers," and in pamphlets covering the principal points in the etiology and methods of restriction and prevention of each of the dangerous communicable diseases.

Upon the receipt of information relative to an outbreak of a dangerous

communicable disease, in addition to the usual instructions and blanks for making the reports, there are mailed to the health officer a sufficient number of pamphlets, relative to the particular disease then present, for distribution to the families and immediate neighbors of the sick person. In this way, the people are educated as to their duty, under the law, and their cooperation with the local health officers often secured.

A pamphlet covering the law respecting nuisances, and containing information relative to their suppression, is published, and distributed among those persons directly interested, when a complaint of a nuisance is made to this Department.

A pamphlet, giving the law, and regulations of this Department, respecting the preparation and shipment of dead bodies, is published, and distributed among the licensed embalmers, railroad officials, and other persons interested in the transportation of the dead.

ANNUAL REPORTS.

About 3,000 copies of the annual reports are published each year, and about 2,500 copies are distributed, immediately after publication, among the local health officials of this State, some local health officials in other states and countries, and the Secretaries of State and Provincial boards of health; and, in exchange, to the leading sanitary journals in this and other countries, and the principal libraries in the United States.

NEOSTYLE WORK.

An important method of disseminating information, which has been used very extensively by this Department, is the preparation, by the Rotary Neostyle, from time to time as occasion requires, of short articles, letters, etc., upon subjects of interest to the public, and their distribution to editors of newspapers in this State, to the leading sanitary journals, and to any person who may be especially interested, or who will print or use them for the benefit of others.

During the fiscal year 1906, Neostyle work to the amount of 8,446 impressions was prepared, and a large portion of it mailed as soon as prepared. The principal subjects were: Circular letters to superintendents of schools, commissioners of schools and school directors, relative to instruction in the public schools on the dangerous diseases; reports on the examinations of plans for State Buildings; reports of proceedings of regular meetings of the board; proposed rules and regulations for the adoption of local boards of health; "Lock-jaw and the fourth of July"; and "Proposed preambles and resolutions relative to cesspools."

TEACHERS' SANITARY BULLETIN.

The publication of the Teachers' Sanitary Bulletin was discontinued with the issue for December, 1905, and a quarterly publication, entitled "Public Health, Michigan", was designed to take its place, of which special mention is made below.

During the first half of the fiscal year 1906, the following articles appeared in the Teachers' Sanitary Bulletins:

"The Benefits of a State Sanatorium for Tuberculosis", by Angus McLean, M. D., and "Discussion of the Tuberculosis Problem"; by Frank W. Shumway, M. D. (July, 1905); "The Sanitary Disposal of Excreta, the key to

the Pure Water Question", by Thomas S. Ainge, and "Heating and Ventilation of Residences", by John R. Allen, C. E. (August, 1905); "Typhoid Fever Limited", by Alexander G. Brown, M. D., "Restriction and Prevention of Typhoid Fever", by Michigan State Board of Health, and "Practical Suggestions to the Public in Typhoid Fever Cases", by Frank W. Shumway, M. D. (September, 1905); "Tuberculosis and its Treatment", by Dr. J. F. Campbell, and "The prevention of Tuberculosis", by Henry Wireman Cook, M. D. (October, 1905); "Typhoid Fever—Methods of Transmission" (Abstract), "Flies as Carriers of Disease," by J. O. Cobb, M. D., and "The Pollution of Rivers and Streams", by Seneca Egbert, A. M., M. D. (November, 1905); "The Physician's Paramount Duty to the Patient and Family in Pulmonary Tuberculosis", by C. P. Ambler, M. D. (December, 1905).

"PUBLIC HEALTH, MICHIGAN", BULLETINS.

As previously stated, the "Public Health, Michigan" bulletin was designed to take the place of the "Teachers' Sanitary Bulletin", as the official organ of the State Board of Health. The first number was issued during the first quarter of 1906, and contained the following articles:

"The White Plague", by Dr. Robert Koch; "Tuberculosis", by the Michigan Department of Health; "Health Officers' Relation to the Profession," by Dr. J. W. Graybill; "Pneumonia", by the State Department of Health; "Summary Relative to Pneumonia in Michigan for 1904", by the State Department of Health.

The second number was published in the second quarter of 1906, and contained the following articles:

"The Tuberculosis Problem and Some Suggestions in Dealing with it", by Dr. E. O. Otis; "Is a Sanatorium for Consumptives a Menace to a Neighborhood?" (New York Bulletin); "Typhoid Fever", by the State Department of Health; "Practical Suggestions to the Public in Typhoid Fever Cases", by Dr. F. W. Shumway; "Relative Importance of Restrictive Measures in Contagious Diseases", by Dr. Bret Nottingham; "Diphtheria", by the State Department of Health; "Antitoxins and Their Uses in Public Health Work", by Dr. E. M. Houghton.

WARNINGS TO HEALTH OFFICERS RELATIVE TO IMMIGRANTS, POSSIBLY EXPOSED TO DANGEROUS COMMUNICABLE DISEASES, DESTINED TO SETTLE IN MICHIGAN.

During the fiscal year 1906, six notices were received from the U. S. Commissioner of Immigrants at Philadelphia, Pa., and five from the Dominion Immigration officers, Canada, relative to the occurrence of dangerous communicable diseases on board steamships prior to their arrival at United States and Canadian ports.

These notices gave the names and destinations of immigrants on board intending to settle in Michigan; and copies of these notices, including the lists of the names of the immigrants, were made on blanks, designed in this office for the purpose, and promptly sent from this office to the health officer of the jurisdiction where the immigrants intended to settle. The purpose of such action is to aid the health officials in preventing outbreaks of dangerous communicable diseases, and, as a matter of fact, this method of forewarning the health officials of the localities where possibly infected immigrants are destined to settle has been productive of good results, and in recent years, while these measures have been in use, very few outbreaks have been traced to immigrants.

SCHOOL WORK.

In compliance with Act No. 146, Laws of 1895, this Department has mailed to the teachers and superintendents of the public schools in this State pamphlets and bulletins containing data and statements for use in giving oral and blackboard instruction relative to the modes by which each of the dangerous communicable diseases are spread and the best methods for the restriction and prevention of each such disease. Prior to January 1, 1906, at the beginning of each school year, a copy of the circular [C. 281], formerly [226]*, was mailed to each teacher and superintendent, followed by a copy of the "Teachers' Sanitary Bulletin" each month.

In the early part of 1906, a special edition of the "Public Health, Michigan" bulletin was prepared for the use of teachers and superintendents, to take the place of pamphlet [C. 281]. The new manual contains the documents issued by this department on the restriction and prevention of nine of the dangerous communicable diseases, the document on "Disinfectants, their relative value and uses", and a list of suggestive questions for teachers. In addition to this special edition of "Public Health", each teacher and superintendent have been supplied with a copy of each regular quarterly issue of the bulletin.

For the purpose of securing the cooperation of superintendents and commissioners of schools in this work, copies of the two following letters were mailed to each superintendent, and a letter somewhat similar to the first was mailed to each commissioner.

STATE BOARD OF HEALTH.

MICHIGAN.

Office of the Secretary, Lansing.

August 28, 1905.

DEAR SUPERINTENDENT:

The law provides that there shall be taught in every public school in Michigan the principal modes by which the dangerous communicable diseases are spread; and the best methods for their restriction and prevention. The same provision makes it the duty of the State Board of Health to furnish the material for such instruction.

In compliance with this law, we have prepared data upon the nine most dangerous communicable diseases. We have made an effort to have the instructions plain and specific—professional and technical terms are largely omitted. A teacher will find no difficulty in giving the necessary instruction from them. It is our aim to make these publications as practical as possible; to the end that the teachers will take an interest in the same.

We shall accompany the data with a brief suggestion on teaching the subject. May we ask that you also outline some plan as to how and when the instruction shall be given. The earnest labor put upon the preparation of this subject matter should not go to naught. Yet, we are constrained to believe that, in some instances in the past, it has. With your personal interest and attention, may we reasonably hope for a new impetus in this work.

By the methods pursued in the past, not all the material issued from this office has reached the teacher at her school address, some of it going to her home address. Hence, we believe it will insure more accurate results to send our publications, calculated for use in the schools, direct to the Superintendents. To be distributed by them to the several teachers under their supervision. This being the custom of the Superintendent of Public Instruction's Department, and could it be carried out in this Department, it will make the practice of distributing State publications uniform. At the same time, insure them reaching their proper destination.

*A sample of this circular may be found on page xlv of the annual report of this Department for 1896.

We desire a correct list of the teachers under your supervision for the ensuing year. Will you please furnish this Department with the same as soon as possible after September 1, next. If this list is furnished our office, we will see that the material for each teacher is properly addressed and in separate covers, before being forwarded to you. Superintendents of city schools may, if they prefer, send us just the names and addresses of the Principals, with the number of teachers under each. When this is done, we will prepare packets for each Principal; to be distributed by them to their assistant teachers. In this way the distribution will be a light task for you.

May we hear from you on any suggestions you may have relative to the subject matter of this communication. In your reply will you state to what extent the publications of this office have been made use of by the teachers under your supervision in the past. We want this item just as it is. If they have not been used say so. If they have been used to what extent? We very much desire your thorough cooperation. A self addressed envelope is enclosed for your reply.

Very respectfully yours,

F. W. SHUMWAY,

Secretary.

STATE BOARD OF HEALTH.

MICHIGAN.

Office of the Secretary, Lansing.

September 18, 1905.

DEAR SUPERINTENDENT:

Under separate cover we are sending you our May and June sanitary bulletins. A sufficient number are enclosed to supply your entire corps of teachers.

These pamphlets are issued not for class use as are those on the communicable diseases; but for the purpose of disseminating general information on sanitary questions. They might be profitably discussed at your teachers' meetings, likewise used as a subject for reading at the morning exercises. Their discussion now and then in connection with the physiology class might be found interesting and appropriate. I would further suggest that they be kept on file in the school library; and that the older pupils be encouraged to read them. And where special interest is manifested, that the pupils be permitted to take them to their homes to be read there. Thus in every way utilizing the information to create a wholesome public sentiment for sanitary conditions in your community.

This Department, as previously announced, purposes issuing for teachers' use a pamphlet treating in detail on communicable diseases; together with their causes and modes of prevention. In these pamphlets the subject will be treated more fully and specifically than can be in any text book. For in the latter, the treatment of each subject must of necessity be brief. It is our object to make the information in this pamphlet full and explicit enough for the guidance of households and communities in case of a dangerous communicable disease outbreak. This is the information that this office desires to give to the people. We aim to have the work on this pamphlet completed, so that it may be distributed during the next quarter.

We wish to thank you in advance for any assistance you may give us in interesting the teachers under your supervision, in our publications. Therefore, when these reach you, we shall appreciate a few words from you to your teachers, which may stimulate them to make more and better use of this subject in their school work. Again thanking you,

Believe me,

Very sincerely,

FRANK W. SHUMWAY,

Secretary.

In addition to the foregoing methods of instructing the teachers and others interested in school work, Dr. F. W. Shumway, the Secretary, and J. E. McDonald, the Deputy Secretary, of this Department, have, upon invitation, attended teachers' meetings and spoken upon subjects of interest, during the fiscal year 1906, as follows:

Michigan Normal Farmers' Institute, held at the Michigan Agricultural College, November 21, 1905.—“The State Board of Health and its Work”, by Dr. F. W. Shumway.

Tuscola County Teachers' Association. Meeting held at Caro, December 8, 1905.—“Sanitary Instruction in our Public Schools”, by Dr. F. W. Shumway.

Branch County Teachers' Association. Meeting held at Coldwater, October 28, 1905.—“Teaching Sanitary Science in the Schools”, by J. E. McDonald.

Allegan County Teachers' Association. Meeting held at Allegan, December 2, 1905.—“The State Board of Health and its Relation to the Schools”, by J. E. McDonald.

Hillsdale County Teachers' Association. Meeting held at Hillsdale, February 10, 1906.—“Communicable Diseases”, by J. E. McDonald.

While the law requires that the pupils in our schools shall be instructed in the methods of preventing diseases, it does not require that the buildings in which the pupils are taught shall be equipped with the proper means for securing a constant and adequate supply of fresh air in each of the rooms, and as a result, a large number of our school buildings are imperfectly ventilated, hence predisposing to disease. In conjunction with the Department of Public Instruction, this Department is earnestly working for better sanitary conditions in our schools, the work, however, on the part of this Department, being limited by the lack of an appropriation for this purpose. In addition to advice by mail relative to the sanitary arrangements of school buildings, the Sanitary Engineer of this Department has, upon request, made inspection of a number of school buildings with the view of determining their sanitary condition and advising the boards of education relative to the necessary changes and improvements. Reports relative to two such inspections may be found on subsequent pages, under the heading “Special investigations by the Sanitary Engineer.”

ADVICE TO LOCAL BOARDS OF HEALTH.

In addition to many letters of advice to local boards of health relative to the suppression of nuisances, etc., the following letter and suggested “Rules and Regulations” were prepared for the purpose of securing the cooperation of such boards in a general movement for better local sanitary conditions.

STATE DEPARTMENT OF HEALTH.

MICHIGAN.

Office of the Secretary, Lansing,

To.....,

President Local Board of Health.

.....Michigan.

MY DEAR SIR:

Recognizing, as we do, the importance to every local health board in the State, that certain rules and regulations be formulated and adopted for the carrying on of the public health work, I commend to the serious consideration of your new board, the need and benefit of such action. The law requires this; but many local boards of health fail or neglect to adopt such rules. If your board has not already adopted a set of rules and regulations, let me suggest that it be done. It is important to pass such rules, not alone because the law requires that it be done; not alone that you may avoid the embarrassment which some of our local boards have suffered in their failure to formulate and adopt such regulations; not alone as a means of self-protection to your board; but, chiefly, because it serves the welfare of your community more effectually.

The need of some such action on the part of the local board is nowhere more conspicuously shown than in the frequent lack of co-operation between the local physicians and the

health officials. Every month, we receive from the Secretary of State's office, notices of deaths from communicable diseases, which have never been reported, as the law requires, by either physicians or householders to the local health officer. Of a large number of these deaths, the health officer never even hears, except from this department a month or six weeks after death occurs. It is then too late for him to see that all restrictive measures are observed in accordance with the law; or to enable this department to be of service at the time when its benefit would be felt. It is safe to believe, too, that many recoveries from these diseases occur, which never, in any way, come to the notice of the proper health officials. Such failure to report is, we are confident, due, in many instances to ignorance of the law. Now, the statute contemplates that the public health shall be protected. It is mandatory in its requirements of householders and physicians to report communicable diseases at once to the local health officer. Furthermore, the law provides remuneration to the physician who makes such report. [See Sections 4452, 4453 and 4454, Compiled Laws 1897.] The authority to enforce the attending physician to make such reports lies not with this department, but is wholly in the hands of the local board. [See Sections 9808, 9809 and 4464, C. L. 1897.] And while your local board of health is given this power, yet it is believed that co-operation can be secured by calling attention of physicians to the law and to the urgent need of such prompt reports. Indeed, the statute provides that the local board shall take especial action in the matter by publishing in the local newspapers or otherwise, all their rules and regulations.

I would suggest, therefore, that your new board of health take immediate action to adopt certain rules and regulations, and through the newspapers,—or better still, in pamphlet form,—to put the same before the citizens of your community. In formulating such regulations, this department, if you so desire, will cheerfully render any aid or suggestion within its power, otherwise than those already given in our publication, Pamphlet 120, relative to the work of local boards and health officers.

I would especially recommend that plan so successfully adopted by local boards in large cities,—the distribution, among physicians, of small leaflets, containing your rules and regulations, also quoting the law regarding the necessity of reporting cases and payment for same, etc., and soliciting their co-operation in prompt reports to the local health officer. This method places the facts in the hands of those who most need it.

Kindly give the matter your earnest consideration. If this department can be of service to you in any way, kindly advise us, and we will gladly co-operate with you.

Very truly yours,

FRANK W. SHUMWAY,

Secretary.

The following outline is a suggestion to Local Boards of Health, of Rules and Regulations to be adopted for the guidance of local health boards and health officers.

Additions or amendments can be made to these general rules, as in the judgment of your board the local conditions demand.

In compliance with Section 3, Public Health Laws of the State of Michigan, we, the Board of Health of the township (or village) of, County of, and State of Michigan, have adopted the following Rules and Regulations for the preservation of the public health and safety.

It shall be the duty of the health officer to enforce the following Rules and Regulations, and notify the prosecuting attorney of any violations of the same:

RULES AND REGULATIONS.

Section I.

Prevention of Disease.

Rule 1. It shall be the duty of the owner or occupant of any dwelling house or other building in which there shall occur a case of diphtheria, scarlet fever, smallpox, pneumonia, consumption, meningitis, measles, whooping-cough, typhoid fever, or any other communicable disease dangerous to the public health, to immediately give notice thereof to the

health officer of this township. Refusal or neglect to comply with this rule shall subject such owner or occupant to a fine not exceeding one hundred dollars.

Rule 2. Whenever any physician, or any person acting as such, whether living in this township or outside thereof, shall be called in this township to treat any patient who is sick with smallpox, scarlet fever, diphtheria, or any other communicable disease dangerous to the public health, such physician shall immediately give notice thereof to the health officer of the township; and every physician who shall neglect or refuse to give such notice shall forfeit for each offense a sum of not less than fifty nor more than one hundred dollars.

Rule 3. This Board of Health, or its health officer, will, upon receipt of such notice as provided for in Rules 1 and 2, and whenever in their opinion a disease dangerous to the public health exists, take steps for the prevention of the spread of such disease by placard and quarantine, and by such other measures as they may deem necessary or expedient. And it shall be the duty of every person connected with such a case of dangerous communicable disease to strictly abide by the orders and advice which this board or its health officer may issue.

Rule 4. No person shall take down, remove, injure or deface any card or sign which may have been placed by order of the Board of Health or health officer upon any building or premises. No occupant of said placarded building or premises shall leave the same, and no person except the attending physician or physicians, nurses and clergymen shall enter the same without first obtaining the permission of said Board of Health or health officer.

Rule 5. In case of death of any person from smallpox, diphtheria or scarlet fever, the body of such deceased person shall not be taken to or inside of any church, public building or any other public place, nor to any private residence or building other than that upon the premises where said death occurred; but said body shall be privately conveyed to any proper cemetery between the hours of seven o'clock in the evening and seven o'clock in the morning, and therein buried without any public demonstration or public funeral services, unless otherwise ordered by the Board of Health or its health officer.

Rule 6. No person sick with cholera, smallpox, diphtheria, scarlet fever, or any other dangerous communicable disease, no corpse of a person dead from one of the above named diseases, or from any other dangerous communicable disease, and no article which has been infected or is liable to propagate or convey any such disease shall be brought within the limits of the township, without the special permit and direction of the Board of Health thereof. Whoever violates the foregoing regulations incurs the penalty of the law.

Rule 7. Permits for the removal of infected articles or persons, in accordance with the law, may be granted by this Board, or by its health officer when the Board is not in session, under circumstances and conditions recommended by the State Board of Health.

Section II.

Prevention of Disease in Public Schools.

Rule 8. It shall be the duty of the principal of any school, or the teacher in any school room or building, whenever any disease dangerous to the public health breaks out in their room or building, to immediately notify the health officer, whose duty it shall be, upon receiving such notice, to investigate the same at once and institute such restrictive measures as will control the spread of the disease.

Rule 9. Whenever smallpox, diphtheria, scarlet fever, or other dangerous communicable disease breaks out in a household containing school children, it shall be the duty of the health officer to immediately notify the school board and the principal of the schools of the name and character of the disease.

Rule 10. Whenever the principal or teacher of any public or private school in this township receives from the Board of Health or health officer notification that any disease dangerous to the public health exists in any household, such principal or responsible head shall exclude from his or her school all pupils from such household until receiving further notice from the health officer that such disease no longer exists in said household and that the premises have been properly disinfected and renovated. Teachers in the public schools shall, during an epidemic of smallpox and varioloid, exclude all pupils who have not been properly vaccinated, or have not had smallpox or varioloid.

Rule 11. Parents and guardians are directed not to send children sick with measles, whooping-cough, chicken-pox, or any other communicable disease, to any private or public school until such children shall have fully recovered from said disease.

Section III.

Prevention of Nuisance.

Rule 12. No privy vault, cesspool, or reservoir into which a privy, water closet, stable or sink is drained, shall be established or permitted within such distance of any well, spring, or other source of water used for drinking or culinary purposes as to contaminate such source of water supply. Said privy vaults, cesspools, or reservoirs shall be cleaned out at least once a year; and from the first day of May to the first day of November following, shall be thoroughly disinfected at least once in every month by adding one or two pounds of copperas dissolved in a pailful of water. Also, no property owner shall suffer or permit water to be drawn from any well or other source of water supply on premises owned by him, which is not perfectly clean and wholesome. He shall cause such contaminated source of water to be cleaned at once.

Rule 13. No person or persons shall suffer or permit any stagnant or filthy water, dead animals, putrid meats, decayed fruits or vegetables, or any foul or offensive drain, sink, privy, cesspool, slops, garbage, manure, or any other offensive thing that may be detrimental to the health of any person, to remain on their premises; nor shall they deposit the same in any street, alley, open lot, nor in any of the streams within the limits of the township. All such offensive articles shall be buried at least 100 feet distant from any well, spring, or other source of water used for drinking or culinary purposes.

Rule 14. No hogs shall be kept within 100 feet of any dwelling or source of drinking water, and then only in pens with floors, kept entirely free from standing water, and regularly cleaned and disinfected at least twice a week.

Rule 15. All garbage, swill or house offal shall be kept in properly covered receptacles, and shall be removed at least twice a week, between the first day of May and the first day of November succeeding, and once a week at all other seasons.

Rule 16. No animal affected with an infectious or contagious disease, as glanders, etc., shall be brought or kept within the limits of the jurisdiction of this Board, except by permission of the Board or its health officer. Likewise no diseased animal or its flesh, and no decayed, diseased or unfit meat, fish, vegetables, fruit, or adulterated milk or other articles shall be sold or offered for sale as food.

Rule 17. When any dumb animal or fowl shall die within the limits of this jurisdiction the same shall be removed by the owner or occupant of the premises within twenty-four hours, and buried at a reasonable depth below the surface of the ground, so as to leave no stench; and if said owner or occupant shall fail to perform the above duty within twenty-four hours after notification by this Board or its health officer, he shall be liable to the penalty hereinafter provided.

Rule 18. Whenever in the judgment of the Board of Health it shall be deemed necessary for the public health, the said Board will at once take possession of any building, dwelling, house, shed, outhouse, premises or ground upon which, in their judgment, there exists any nuisance prejudicial to the public health, and if the owner or occupant shall refuse or neglect to forthwith abate such nuisance in the manner directed by said Board, said Board will cause the same to be abated forthwith in such manner as they deem proper, and all expenses incurred thereby shall be a legal claim against the owner and a lien upon said property, to be collected in the same manner as other special assessments. Said Board will, also, when they deem it requisite for the public health, at once and by force, if necessary, close up such aforesaid buildings or premises, and exclude all occupants therefrom, until such nuisance shall have been fully abated. Any person who shall resist the action of the Board or its agents under this rule, shall be liable to the penalties hereinafter provided..

Upon invitation, the Secretary or Sanitary Engineer of this Department have made visits to localities for the purpose of conferring with the local authorities relative to the correction of insanitary conditions, but, as before stated, this work must necessarily be limited on account of the lack of an appropriation for this purpose. A record of such visits during the fiscal year 1906 follows:

MOVEMENTS OF THE SECRETARY DURING THE FISCAL YEAR 1906.

In addition to his attendance at the regular and special meetings of the Board; the meeting of the Upper Peninsula Medical Society, at Hancock and Houghton, on August 9 and 10, 1905; the meeting of the Tuscola County Teachers' Association, at Caro, December 8, 1905, mention of which is made

on a preceding page; trips to Kalamazoo, April 24, 1906, and Grand Rapids, May 4 and 5 and June 9 and 10, for the purpose of investigating violations of the embalmers' law; attendance as delegate at the Fourth General Conference of State and Provincial Boards of Health with the U. S. Public Health and Marine Hospital Service, Washington, D. C., May 23, 1906; attendance at the Conference of Health Officers, at Grand Rapids, May 31 and June 1, 1906; and attendance at the meeting of the Anti-Tuberculosis League, at Grand Rapids, June 9 and 10, the Secretary of this Department made special visits to the undermentioned localities and for the purposes stated:

Alma, July 23-24, 1905.—Investigation relative to an epidemic of typhoid fever.*

Chippewa county, July 27-31, 1905.—Investigation relative to an outbreak of smallpox in several parts of the county.*

Wexford county, September 18-21, 1905.—Investigation relative to an outbreak of typhoid fever in R. G. Peters' camp.*

Grand Rapids, November 28, 1905.—To consult with Dr. T. M. Koon, Health officer, relative to the restriction of diphtheria in that city.*

Detroit, December 12-14, 1905.—To study the workings of the medical inspection of schools, and to make inspection of the sewerage system and the disposal of garbage.

In respect to the medical inspection of schools, a very satisfactory condition was found, the teachers being very enthusiastic over the results already obtained.

Ithaca, January 23-24, 1906.—Objection having been made by some of the citizens to the use of the basement of the high school building at Ithaca for school purposes, on the ground of insanitary conditions, the matter was referred to the State Board of Health, and at the request of the State Board of Education, on January 23, 1906, Secretary Shumway of the State Health Board, in company with Deputy Superintendent of Public Instruction W. H. French, visited Ithaca and made an investigation. The investigation disclosed a lack of proper air and light; also that the floor of said basement was below outlet of drain, making it impossible to remove dampness, and at a public meeting called for the purpose, the insanitary conditions of said basement for school purposes were pointed out and it was strongly advised that the rooms be not used for said purpose. The building of an addition to the present building was recommended as the best method of relieving the congested condition of the building.

An inspection of this building was subsequently made by the Sanitary Engineer of this Department, and a copy of his report may be found on a subsequent page.

Washington, D. C., January 27, 1906.—A Conference with the Postmaster General enabled the Secretary of the State Board of Health to place all publications of the Department under one general title of "Public Health", thereby entering same at Lansing Postoffice at second class or pound rates, making a great saving in the postage account.

Jackson, February 20-21, 1906.—The City of Jackson erected a purification plant to take care of the sewage from the city and also from the State Prison, the State having appropriated a sum of money for this purpose several years ago. The location of the plant in the vicinity of the prison

*Reports relative to these investigations may be found in the articles on typhoid fever, diphtheria and smallpox, in the latter part of this report.

caused the prison officials and residents in that vicinity to protest, fearing the same might become a nuisance and a menace to health, and the Secretary of this Board was called upon to investigate the same. In company with Mayor Todd and some of the city officials the plant was visited, and while not completed, it was evident from its construction that there was no cause for alarm, for properly conducted, there is no danger of offensive odors passing off. A report in full was made to the warden of Jackson Prison after conferring with Sanitary Engineer Pierson who had charge of the work.

Lowell, June 21-22, 1906.—Investigation relative to a serious outbreak of smallpox in the village.*

SPECIAL INVESTIGATIONS BY THE SANITARY ENGINEER OF THIS DEPARTMENT DURING THE FISCAL YEAR ENDING JUNE 30, 1906.

REPORT RELATIVE TO AN ALLEGED NUISANCE IN ARMADA VILLAGE.

Frank W. Shumway, M. D.,
Secretary State Board of Health.

DEAR DOCTOR:

In accordance with your instructions, on October 23, I visited the village of Armada, and, in company with A. E. Millett, Dr. Burton Hodges, and other interested persons, made an investigation relative to an alleged nuisance from the discharging of sewage into the creek which runs through the village.

In the absence of a plan of the sewers, I was furnished with a rough sketch of the same, a copy of which is submitted herewith as a part of this report.

It appears that since the installation of the public water service, and without the permission of the village council, a number of house connections have been made with sewers which were intended and constructed only for the removal of storm water. There are about fifteen water closets, a number of sinks, and some bath tubs, which are discharging into the sewers. The amount of water flowing from these at the time of my visit, and which I was informed was the normal flow, was very small. Further, the appearance of the main body of water below the sewer outlets did not differ from that of the water above them, in both cases being comparatively clear, and the bed and sides of the creek were free from sewage deposits. Chemical analyses of samples of water taken from the creek both above and below the sewer outlets would indicate what, if any, pollution is due to the sewage.

In addition to the houses which are connected with the sewers, there are several houses discharging sewage, through private drains, directly into the creek.

One of the principal sources of complaint is an open ditch connecting the sewer on Fulton street with the creek, and which is in a foul condition throughout its entire length and fouls the water in the creek at the point of discharge.

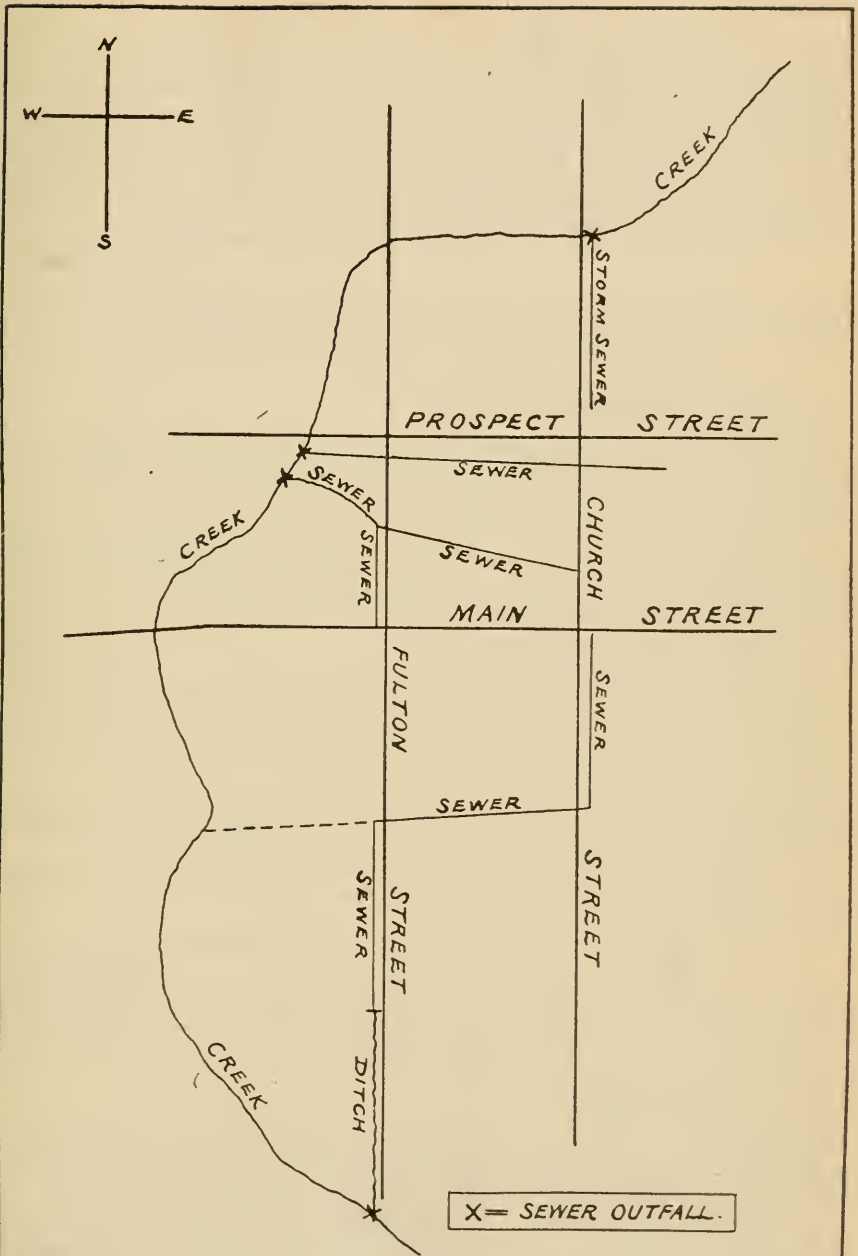
In making use of the nearest watercourse for the disposal of sewage, this village is but following the plan in almost general use throughout the State, but on a much smaller scale than that of many other localities. This cannot, however, be considered a valid reason for violating one of the first principles of sanitary science, and the necessity for changes in the sewerage system is urged upon the village council.

The disconnection of the house drains from the village sewers would at once remove the possibility of direct contamination of the water in the creek. This, however, is not advisable, for the reason that cesspools would then become a necessity.

The only method of dealing with this question that could be considered satisfactory from a sanitary point of view would be the construction of a new and separate system of sewers, with one outfall only, for the reception of the sewage from houses and other buildings, and the purification of the sewage before it is discharged into the creek.

Allowing for a sufficient fall in the sewers, the outlet of the new sewer would probably be but slightly higher than the low water mark of the creek, and at flood times completely submerged. This would necessitate the pumping of the sewage, and the construction

[* See foot note on the preceding page.]



ROUGH SKETCH OF SEWERAGE SYSTEM, ARMADA.

of an artificial filter at an elevation above the high water mark of the creek sufficient to allow for free drainage at all times.

Chemical treatment of the sewage is not recommended for the reason that it is very expensive, and would remove only a portion of the organic matter.

Pending a radical change in the system, it is recommended that no more connections with the present sewers be allowed; that the creek be cleaned by the removal of weeds and other obstructions; that the open ditch be cleansed of sewage sludge; and that, providing sufficient fall can be obtained, the Church Street sewer, from a point where it crosses Fulton Street, be continued in a westerly direction to the creek, as indicated by dotted line on the sketch. These changes would effectually abate the nuisance from the open ditch, and be a considerable improvement over the present condition of things.

Very respectfully,
THOS. S. AINGE.

REPORT ON INSPECTION OF SITE AND PLANS FOR A PROPOSED SEWER AT THE MICHIGAN SOLDIERS' HOME, GRAND RAPIDS.*

Frank W. Shumway, M. D.,
Secretary State Board of Health.

DEAR DOCTOR:

In accordance with your instructions, on Dec. 30, I visited the Michigan Soldiers' Home, at Grand Rapids, and examined the plans for the proposed new twelve inch main sewer, which is designed to discharge the sewage from the Home into the city sewers instead of into the river.

I was informed by Mr. T. O. Williams, the County Surveyor, that the sewer will be about 1,950 feet in length, and have a total fall of about eight and one-half feet. Beginning at the highest point of the sewer, for about two-thirds of the distance, the inclination will be about 1 in 178, and for the lower end, about 1 in 480.

The connection of the sewer from the Home with the city sewer will be through an automatic flushing tank, to be furnished by the city, for the purpose of forcing the sewage along a line of sewer with limited inclination.

The amount of fall for the proposed sewer for the Home is necessarily limited, especially at the lower end of the sewer, but with the large volume of water which will flow through it, together with the usual daily flushing of the branch sewers with a two-inch hose, the normal flow of the sewage will probably be somewhat greater than the minimum amount required to render the sewer "Self-cleansing."

It is suggested that, when the sewer is built, a manhole be constructed near to the point where the gradient of the sewer is changed from 1 in 178 to 1 in 480, and that provision be made in this manhole for damming up and suddenly releasing a large body of water for the removal of deposits or stoppages in the lower end of the sewer.

I was informed by Col. Turner, Commandant of the Home, that the plans would shortly be forwarded to this office, for examination by the members of this Board at the next regular meeting.

Very respectfully,
THOS. S. AINGE.

REPORT RELATIVE TO THE UNSUITABILITY OF BASEMENT ROOMS FOR SCHOOL PURPOSES, AT ITHACA.

To the Honorable the Board of Education,
Ithaca, Michigan.

GENTLEMEN:

For the purpose of determining the suitability, or otherwise, of certain basement rooms for school purposes, in accordance with your request, on Jan. 25, I visited the school building of your village and made an inspection of the rooms in question.

I do not hesitate to pronounce the rooms entirely unsuited for occupation as school rooms, even for short periods of time, and for the following reasons:

1. The floors, and those parts of the walls below grade, are in contact with the ground, permitting ground air and moisture to enter and produce an unwholesome condition in the rooms.
2. The ceilings are more than two feet lower than the minimum height required for the proper distribution of light, and to afford sufficient breathing space.

*The report of the examination of these plans may be found on a preceding page.

3. The lighting is insufficient, both in point of glass surface and arrangements for distribution of the light.

4. There is no adequate ventilation of the rooms.

I was informed that the floor of the southwest room had been taken up and removed because of its rotted condition, and, judging from the musty odor in the southeast room, the floor of that room has made considerable progress toward decay. A similar condition probably exists behind the lower portions of the wainscoting of the rooms. This is but the natural result of placing woodwork in contact with the ground, or with walls not provided with proper damp-proof courses.

An open area, the bottom of which is considerably lower than the ground inside the rooms, constructed around the outside walls, and well drained, together with adequate ventilation of the space beneath the wooden floors of the rooms, would, to a considerable extent, prevent the passage of ground air and moisture into the rooms.

Additional height in the rooms could be secured by excavation, but the floors of the rooms would then be over six feet below grade. According to the recognized rule that at least one-half the height of an occupied room in a basement should be above grade, the lowering of the floors would not assist in making the rooms habitable.

Were other conditions such as to warrant it, the addition of more glass surface, properly distributed, would effect a considerable improvement in the lighting of the rooms.

At the time of my visit there was no draft in the ducts provided for the removal of vitiated air from the rooms. This was probably due to the many angles in the ducts; to their connection with a common flue and at a point above the registers of other rooms; and to a hole in the sheet iron pipe in the attic which connects the ducts with the common flue.

To relieve the congested condition of the school rooms it is recommended that a wing be added to the building, on the east or west sides, and so arranged and constructed as not to interfere with the proper lighting of adjacent rooms in the main building.

Attention is called to the insanitary construction of the privies and to the need for water closets and washing accommodation inside the school building. It is suggested that two of the basement rooms could be used for this purpose, subject to the following provisions:

Well lighted and convenient means of access to the rooms, both from inside and outside the building.

Properly equipped and well drained floors in the rooms; and vent flues, of adequate size, and with outlets above the roof separate and distinct from the flues of any other rooms in the building.

Respectfully submitted,

THOS. S. AINGE,

Sanitary Engineer.

Subscribed and sworn to before me this twenty-ninth day of January, one thousand nine hundred and six.

WILLIAM ENNIS,

*A Notary Public in and for the County of
Ingham, State of Michigan.*

[In connection with this report, it should be stated that, owing to a difference of opinion amongst the residents of the village relative to the desirability of using the basement rooms, of enlarging the present school building, or of erecting a new building, on what was considered by some to be an undesirable site, at a special meeting called for the purpose of considering the several plans, it was decided that the sworn statement of the Sanitary Engineer of this Department should be made the basis of their action in the matter. —EDITOR.]

REPORT RELATIVE TO THE PROPOSED USE OF BASEMENT ROOMS FOR SCHOOL PURPOSES, AT HARTFORD.

Frank W. Shumway, M. D.,

Secretary State Board of Health,

DEAR DOCTOR:

In accordance with the request of Edward Finley, Secretary of the School Board of Hartford, on May 7, I made an inspection of the basement rooms of the school building of that village, to determine whether they are in a suitable condition, or can be made suitable, for school rooms for about twenty pupils each.

In so far as relates to the lighting, height, breathing space and dryness of the rooms, there can be no objection to their use for the purpose stated; but, beyond what could be effected by the opening of windows, there is no provision for the ventilation of the rooms.

To effect a constant change of air in the rooms, flues for the supply of fresh air and the removal of vitiated air would be necessary.

For the supply of fresh air, a duct, of dimensions proportioned to the size of the vent flue, should be carried from one of the windows on the west side of the room to a point immediately under a stove, of ample dimensions, located on the west side of the doorway, and the stove should be surrounded by a tight sheet metal jacket, considerably larger than the stove, and about six feet high. The position of the stove should be such as to secure the passage of the incoming air through every part of the room before it reaches the vent register.

The proposed method of supplying fresh air to these rooms is not what would be desired, but it is believed to be the best suited to the existing conditions.

For the removal of vitiated air, a galvanized sheet iron or brick flue should be constructed on the inside wall of the room, and should extend from the floor of the basement room to a point above the highest part of the roof. If possible to terminate this flue in the belfry, that would be a desirable location for the outlet. The vent flue should have an area of not less than two square feet, and should be carried vertically to the attic, and as nearly vertical as possible from the attic floor to the roof. The vent register in the room should be on the east side of the doorway, and should have an area somewhat larger than the flue to which it is connected.

I would suggest that if only one room is to be used at the present time, preference be given to the south room, in which case the present partitions should be removed, a wooden floor placed over the cement floor, and provision made for the ventilation of the space between the wooden and cement floors to remove the possibility of dry rot.

The finishing of the walls and ceiling will be governed by the tastes of the school board and the necessities of the case. It is suggested, however, that there be no wooden wainscoting on the walls, and that the walls and ceiling be made smooth so as to facilitate thorough cleansing.

For the purpose of making a cleaner and more pleasing approach to the north and south rooms, I would suggest that the furnace room be separated from the corridor by a tight partition, the top part of which should be of glass to furnish light to the corridor. Additional light could be secured by placing glass in the upper panels of the doors of the north and south rooms.

In my investigation, I discovered a wooden ventilating duct laid perfectly flat on the joists in the attic and having two square turns before it reaches the brick stack to which it is connected. For the better ventilation, and incidentally the better heating, of the room which this duct is supposed to ventilate, it is suggested that the wooden duct be replaced by a galvanized sheet iron pipe, inclined upward, and connected to the brick flue at a point as near to the roof rafters as practicable.

Respectfully submitted,
THOS. S. AINGE.

[Sometime later, the plans for the suggested changes in these rooms were submitted to this Department for examination, and the following criticisms were made thereon.—EDITOR.]

Edward Finley,
Secretary of the School Board,
Hartford, Michigan:

MY DEAR SIR:

Your letter of July 13, together with the blue print and specifications of the proposed changes in your school, were received.

There are one or two points in the plans which are not in accordance with the recommendations made in Mr. Ainge's report of May 12:

The stove and vent register are not located in the positions recommended, but it is believed the proposed arrangement will work satisfactorily.

The vent flue should be of galvanized sheet iron throughout, and not of lath and plaster, or matched lumber, as suggested in the specifications.

Lath and plaster flues are rough inside, and the keys of the plaster would offer considerable resistance to the upward flow of air in the flue.

A wooden flue will shrink, and the shrinkage would cause openings through which air could leak from or enter the flue, and thus reduce the draft.

The area of the vent flue is not what was recommended, viz., "not less than two square feet." This is estimated on the basis of a flue 60 feet high which will remove an amount of foul air equal to 1,800 cubic feet per hour for each occupant, when there would be a difference of 25 degrees between the temperatures of the indoor and outdoor air (70 degrees

inside and 45 degrees outside). If more than 28 persons are to occupy the room, now or at any future time, the flue should be still larger than two square feet in area.

In making the changes in the vent flue of the second floor room, it should not be connected at any point with the new flue from the basement room. Each flue should go separately to the roof.

There is no provision for cleaning out the fresh-air duct under the basement floor. As dust will collect in this duct, provision should be made for its removal at least once each year.

It would be well to instruct the janitor, and also the teacher who will occupy the room, that the "direct-air door", provided in the fresh air duct, should not be open at any time during school session.

Very truly yours,

F. W. SHUMWAY,
Secretary.

THE PREVENTION OF TETANUS (LOCK-JAW).

With the view of securing protection for the young people of this State from dangerous fireworks, and from the deadly toy-pistol, copies of the following letter and circular were mailed to the presidents of the several local boards of health. At the same time, a copy of the circular was mailed to the editors of the prominent daily and weekly newspapers in the State, with the request that the same be printed as fully as possible. A very general response was made by the newspapers, and quite a number of local boards of health took official action relative to the same:

STATE DEPARTMENT OF HEALTH.

MICHIGAN.

Office of the Secretary, Lansing.

June 13, 1906.

To the President of

The Local Board of Health.

DEAR SIR:

At the time of our national celebration in commemoration of Independence Day, there occur yearly in our State an undue number of deaths, besides a deplorable number of casualties from the use of improper and dangerous fireworks.

Since it is the little children and younger people of our communities who are chiefly the victims of these dangerous explosives, and since it is the judgment of this department that this practice is a grave menace to our young citizens and that they should receive official protection in their various communities, I respectfully beg to call your attention to the enclosure, which sets forth the facts known connected with dangerous firearms and other explosives, and also the statute of the State of Michigan bearing on the subject.

I earnestly trust this matter may be brought before the proper authorities of your community, for their serious consideration; and I would urge that official action be taken in passing ordinances, or otherwise, to further the protection of human life and limb.

Very truly yours,

F. W. SHUMWAY,
Secretary.

LOCK-JAW AND THE FOURTH OF JULY.

Deaths from lockjaw result more from our celebration of the Fourth of July than from any other cause. Not only in our own State, but also throughout the entire country, the number of deaths from lock-jaw in the month of July is greater than any other month of the year. That this increase in the number of fatalities can be prevented, is beyond question; and that it should be prevented, is the responsibility of the general public.

The records of deaths for the past three years in the United States show that fatalities from tetanus, popularly known as "lock-jaw," follow wounds from explosions of blank cartridges, toy-pistols, giant fire-crackers, cannon fire-crackers, torpedo-canes and pin-wheels. The common use of these articles, by children as well as by adults, in the celebration of Independence Day, readily explains the unusual death rate from tetanus in the month of July. In the State of Michigan, there is criminal risk, being a direct violation of the law. In 1883, our State passed a law to prevent the sale and use of such articles to such young children, and reads as follows:

AN ACT TO PREVENT THE SALE AND USE OF TOY PISTOLS.

[Compiled Laws of 1897, Sections 11530-11532, P. A. No. 138 of 1883.]

The People of the State of Michigan enact:

Section 1. That no person shall sell, give, or furnish to any child under the age of thirteen years, any cartridge of any form or material, or any pistol, gun, or other mechanical contrivance, specially arranged or designated for the explosion of the same.

Section 2. Any person, violating any of the provisions of the foregoing section, shall be deemed guilty of a misdemeanor, and upon conviction thereof, shall be punished by a fine of not less than ten dollars, nor more than fifty dollars, and costs of prosecution, or imprisonment in the county jail not less than ten days nor more than ninety days, or both such fine and imprisonment, in the discretion of the court.

Section 3. It shall be unlawful for any person under the age of thirteen years, to have in possession, or use any of the articles named in section one of this act.

It is believed that if people generally know of this law, and in addition know of the real danger resulting from the use of certain fireworks, they will exercise the care and discretion necessary to protect their own interests, to prevent their children, or possibly themselves, from becoming victims of improper playthings.

It may be interesting to note what facts we have at hand to show the connection between the special prevalence of tetanus and the celebration with fireworks on the Fourth of July.

In Michigan, three years ago, in 1903, there were, in July, 27 deaths from tetanus, all following the wounds received from handling fire-works; and in the United States, the number of deaths from the same cause was 415. In 1904, in Michigan, the number of deaths from the same cause, in July, was 5; in the United States, 105. In 1905, the number of deaths in Michigan from the same cause was 7; in the United States, 104. It is at once seen that the number of deaths both in our own State and throughout the entire country, in 1903, greatly exceeded the number of deaths occurring either in 1904, or 1905. After the fatalities were recorded in 1903, the great crusade against the use of improper fireworks on the Fourth of July, began; and the decrease in the two following years in the number of deaths is due chiefly to the aroused public sentiment against such use, and the passing of ordinances in many localities against such use. It is the judgment of this department that if more localities would pass ordinances to control the sale and use of fireworks, a great saving of life would result. Not only is the actual saving of life important, but also the protection of our persons from permanent injury; and in many cities, where the use and sale of fireworks were controlled, not only was the number of deaths from tetanus diminished, but the actual number of accidents was considerably lessened. It is worth while to guard against even a high percentage of casualties.

The fireworks most likely to cause explosions and so permit infection from tetanus are: blank cartridges, giant fire-crackers, cannon fire-crackers,

firearms, including toy-pistols, and torpedo-canes. It is not thought that any of these explosives themselves contain the tetanus germ; for the raw materials do not necessarily contain the bacilli, and the mode of manufacturing fireworks would tend to destroy the germs, should they chance to be present in the raw materials. Moreover, it is well known that certain grave powder explosions do occur, where grains of powder enter the flesh but where no infection from tetanus occurs. It is known that the tetanus germ exists and thrives in the incrustation or dust of filth; and mid-summer, in July, the atmosphere is laden with such dust which settles on the skin of persons. A wound, then, permits the dust so laden with tetanus germs to enter the abrasion of the skin, and, sealed in this excellent medium, tetanus germs become prolific, causing the death of human beings within a short time.

It is believed that by passing ordinances to control the sale and use of blank cartridges, toy-pistols, and other dangerous fireworks; by arousing public spirit, so that merchants are reluctant to sell harmful goods; by inciting parents to a careful and wise supervision of the fireworks to be used by children; and by a more prompt and universal use of antitoxin and prophylactics; by such action, we can prevent this dread and fatal disease, tetanus, from undue prevalence, and guard against what seems to be needless sorrow.

TOTAL AMOUNT AND CLASSIFICATION OF EXPENDITURES BY THE STATE
BOARD OF HEALTH (UNDER PUBLIC ACT NO. 18 OF 1905).
DURING THE FISCAL YEAR ENDING JUNE 30, 1906.

Expenses of members:

Attending regular meetings.....	\$105 03
Other meetings and special investigations	416 11
Engraving, drawing, etc.....	7 83
Instruments and books.....	103 45
Paper, stationery, etc.....	1,440 34
Postage.....	1,800 00
Printing and binding.....	1,729 93
Secretary.....	2,500 00
Expressage.....	43 71
Telegrams.....	6 72
Telephone.....	43 69
Miscellaneous.....	66 74

Total expenditures.....	\$8,263 55
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Unexpended balance, covered back into the State Treasury	736 45
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Amount of appropriation.....	\$9,000 00
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NOTE.—The appropriation (\$9,000.00) at the disposal of the State Board of Health for certain specified purposes, does not include clerk hire, or the expenses in the examination of plans for public buildings; these expenditures *on account of*, but not by the Board, are provided for by other acts of the legislature than those appropriating money to be expended by the Board; and the accounts are kept in other offices, not in the office of the State Board of Health. The accounts for clerk hire are kept by the Auditor General, and are reported in his annual report; the accounts for the examination of plans for public buildings are kept by the Board of State Auditors, and are published in the annual report of that Board.

Respectfully submitted,
F. W. SHUMWAY,
Secretary.

TOTAL AMOUNT AND CLASSIFICATION OF EXPENDITURES BY THE STATE BOARD
OF HEALTH (UNDER SECTION 7 OF ACT 132, LAWS OF 1903), EMBALMERS'
FUND, AS ALLOWED DURING THE FISCAL YEAR, 1906.

RECEIPTS.	DISBURSEMENTS.
Fees from applicants for license and for renewals of licenses..... \$1,168 72	Expenses of members: Attending regular meetings..... \$46 35 Other meetings and special investi- gations..... 170 93 Paper, stationery, etc..... 13 49 Postage..... 400 00 Printing and binding..... 116 57 Engraving, drawing, etc..... 29 00 Compensation of extra clerks..... 279 00 Miscellaneous..... 85 90 Unexpended balance, turned over to the State Treasurer..... 27 48
Total receipts..... \$1,168 72	Total disbursements..... \$1,168 72

PROPOSED STATE SUPERVISION OF THE WATER SUPPLIES AND
METHODS OF DISPOSAL OF EXCRETA IN MICHIGAN.*

BY FRANK W. SHUMWAY, M. D., SECRETARY MICHIGAN DEPARTMENT OF HEALTH.

To add to what has already been said and written upon the subjects of water supply and sewerage, in their relations to the public health, would seem superfluous, were it not for the fact that the pollution of the natural watercourses of our State, with its concomitant evils, is an ever present and vital question in the minds of those intimately connected with public health administration.

Typhoid fever has not been eliminated from our midst, but annually prostrates, approximately, three thousand of the inhabitants of this State, of which number nearly one-fifth are added to the list of decedents from preventable diseases; and the people are burdened to the extent of a loss of tens of thousands of dollars and incalculable suffering thereby.

In dealing with this subject we are not groping in the dark. Science and repeated research have long since placed at our disposal weapons with which to combat the active principle in typhoid fever and many other preventable diseases, and to render impossible their communication, from person to person, through well known channels of infection.

Thus far the measure of success attending the efforts of those who have engaged in this warfare has not reached the limit of what might reasonably have been anticipated. True we have succeeded in stemming the tide of sickness and mortality, but the recollection of past achievements, coupled with the knowledge of far greater possibilities, demand a more vigorous

*Read at the meeting of the Michigan Engineering Society, held at Lansing, January 10, 1906.

and persistent continuation of the contest in the future. The old straw must, if necessary, be threshed over, even at the expense of being considered wearisome, until, by the constant wearing process, the last vestiges of apathy or opposition on the part of the people have been removed.

The subject which I have chosen as the basis of my remarks is not, in its general sense, a new one, at least to the members of this society and to others who have followed the trend of public health administration in other states in recent years. I will endeavor, therefore, to confine my remarks, principally, to a brief consideration of some reasons why the powers, duties and responsibilities of the Michigan Department of Health should be extended to include the *active* supervision of the water supplies and the methods of disposing of excreta in this State, together with an outline of what, I believe, should be the nature and extent of the proposed supervision, at least until a further extension of such supervision may prove to be necessary.

THE NEED FOR STATE SUPERVISION.

The State Department of Health is required by law to have the *general* supervision of the interests of the health and life of the inhabitants of this State.

Pure water being one of the most important essentials to health, and impure water being one of the most important factors in the spread of typhoid fever, and possibly of other diseases, the supervision of the water supplies should, very properly, claim a large share of attention in the work of the Department, as outlined in the law. Within the limits of the appropriations for public health purposes, the Department has, in the past, endeavored to comply with the requirements of the law in this particular, of which mention will be made later. But a *general* supervision, by the State, of the water supplies has its limitations and imperfections, as the experience of upwards of thirty years has proven.

Investigations conducted at long range, begun only after outbreaks of typhoid fever have been reported to the State Health Department, and carried on through the medium of a correspondence between the State Department and the often poorly paid, and in many instances untrained, local health officials, are seldom productive of lasting beneficial results, as the status of the typhoid fever situation would seem to indicate.

The effectiveness of the present State supervision of the water supplies being dependent upon the information derived from the reports of the local health officials, it follows that the neglect to make such reports, or the making of unintelligent or incomplete reports, will seriously interfere with the proper working of the system, and vitiate the statistical work of the State Health Department.

Local supervision, upon which, under the present plan, the purity of the water supplies mainly depends, also has its limitations and imperfections, chief among the latter of which may be mentioned the lack of special training in many of those who are entrusted with the solution of problems which should properly come within the scope of the municipal or sanitary engineer.

The tenure of office of the average health officer is too short, and the compensation far too small to encourage him to devote the time necessary to a thorough understanding of local conditions which may, at any time, give rise to and favor the spread of typhoid fever within his jurisdiction. For the same reasons, after the occurrence of typhoid fever in the locality, permanent remedial measures may be neglected and indefinitely postponed.

Notwithstanding that the efficiency and enthusiasm of the health officer may not have been called in question, a lack of cooperation on the part of the inhabitants may operate to prevent the adoption of measures designed by him for securing or protecting the purity of the water supplies in his locality.

Local supervision may also be limited by reason of the location, in an outside jurisdiction, of sources, or possible sources, of contamination of the water supplies. This would be true in every case where the water supply is taken from a stream or river, or from any of the great lakes. In deciding upon any system of water supply or sewage disposal for a locality, or in any controversy relative to the pollution of a water supply, by reason of its personnel, the State Health Department is eminently fitted to offer a valuable opinion or render an impartial decision thereon. Such action by the Department is now limited by reason of the lack of provision for making the necessary investigations, which would properly include a visit, or visits, to the locality.

In many other states, the necessity for State control of the water supplies has been recognized by the enactment of laws, more or less stringent in their nature, some of which include the appropriation of large sums of money to defray the cost of making extensive preliminary experiments, and for conducting investigations necessary to a proper understanding of existing conditions. In the operation of these laws, abundant evidence of the wisdom of such legislation has been secured.

NATURE AND EXTENT OF THE PROPOSED STATE SUPERVISION.

1. To examine and offer an opinion upon the plans for any proposed new system, or alterations in existing systems, of water supply or disposal of excreta. This plan has, for many years past, been successfully carried out in respect to the sanitary engineering details of the buildings of state institutions in this State, and might, with equal advantage, be applied to many other buildings and works of a public or quasi-public character.

2. To make investigations, upon request or when deemed necessary, relative to the purity, or otherwise, of any water supply.

3. To cooperate with local authorities in securing the discontinuance of any source of water supply deemed unsafe, or that is a menace to health, and in the substitution of a new supply from a desirable source.

4. To make a detailed survey of the water supplies in this State, so that the Department may be able to act promptly and intelligently upon all cases requiring its aid or interference; also to aid in the study of the local prevalence of typhoid fever and the institution of measures for its restriction and prevention. In the absence of a thorough knowledge of the existing conditions, little progress could be made in the institution and prosecution of measures for securing and maintaining the purity of the water supplies.

PAST EFFORTS OF THE MICHIGAN DEPARTMENT OF HEALTH FOR KNOWLEDGE RESPECTING THE WATER SUPPLIES IN THIS STATE.

In the past, principally owing to a lack of funds, the operations of the Department in the matter of securing definite knowledge respecting the condition of the water supplies in the State have been necessarily limited.

With the view of collecting facts for a study of this question which might, at some future time, furnish data for the choice of locations for wells in towns and villages, and for determining the question when, in larger towns and cities, a system of water works, bringing water from a distant source,

might become necessary as a preventive to future evils, in 1875, Dr. Arthur Hazelwood, a member of the Board, and chairman of the committee on water supply, issued a letter to correspondents of the Department asking replies to thirty-six questions relative to the water supply of the particular locality in which each correspondent resided. The letters were responded to quite generally, but the number of localities represented was but a small fraction of the total localities in the State.

In January, 1896, upon a suggestion from Prof. F. S. Kedzie, of the Chemical Department of the Michigan Agricultural College, relative to a systematic study of natural waters of Michigan streams, springs and wells, a report was made to the State Board of Health, by its Secretary, and referred to Prof. Delos Fall, who was at that time a member of the Board and the committee on water supply. To those of you who may not be conversant with the proposed nature and extent of this systematic study, the following quotations from the report in question may prove interesting:

"The great drouth during the past few years, and especially during the last year, has forced many people to obtain their supplies of drinking water from streams. The question as to the safety of such water supplies is an important one which sanitarians and chemists are not properly prepared to meet. Are the vast amounts of sewage and other contaminating substances which find there way into the streams, oxidized and rendered innocuous, or are they so contaminating the streams as to make it dangerous to use such water in cities and villages? Are the dangers to life greater in times of drouth than at other times? How far below a city situated on the bank of a stream do these contaminations of the water which are dangerous to life and health extend? To properly answer such questions, such a systematic study should have been commenced years ago. Should it not be commenced at once?

"When this subject was put before the Secretary of this Board a few years ago, his reply was that the State Board of Health could not, from its meagre appropriations, spare anything for this investigation. Prof. Kedzie now suggests methods whereby it is hoped that the study may be commenced in a comparatively inexpensive manner, and the work divided up, some portion of it allotted to each of the many laboratories in Michigan. He suggests that the regular correspondents of the State Board of Health be asked to make the collections of the water, that students at different colleges be employed in these investigations under the direction of their expert teachers, and that the State Board of Health pay, out of its appropriations, for the jugs or other receptacles of the water, also the express charges, and for such other expenses as shall be required. He asks that the Secretary present this subject to the State Board of Health; also the question, relative to each sample of water,—what shall be determined?

"A year or two ago Prof. Fall, of this Board, proposed to determine the amount of chlorine in the natural waters in springs in different parts of Michigan. This should be done for the streams; also the amount of organic matter; perhaps, also, the presence or absence of pathogenic bacteria. If this last item is to be undertaken, probably it could best be done at the State Laboratory of Hygiene. Other branches of the work might be done at other laboratories, and perhaps bacteriological laboratories may well be started at several of the colleges in Michigan; it is understood that one will soon be established at the State Agricultural College.

"Prof. Kedzie mentioned an investigation by a student at the Agricultural College of the amount of chlorine in the farmers' wells, in one locality in Michigan. It would be an interesting item of information if this question could be answered for a great many localities in Michigan."

I am informed by Prof. Fall that he did considerable work on the examination of spring waters, but not enough for a final report, and that he has recently taken up this work again and will push the matter along.

In addition to the special efforts of the State Health Department, before mentioned, for knowledge respecting the water supplies of this State, the Department has continually labored with the local health officials for information relative to the sources of infection in outbreaks of typhoid fever reported to this Department, to the end that this information might be

studied and made the basis of efforts by the Department for the restriction and prevention of the disease.

COMMENDATION OF THE WORK OF THE MICHIGAN ENGINEERING SOCIETY.

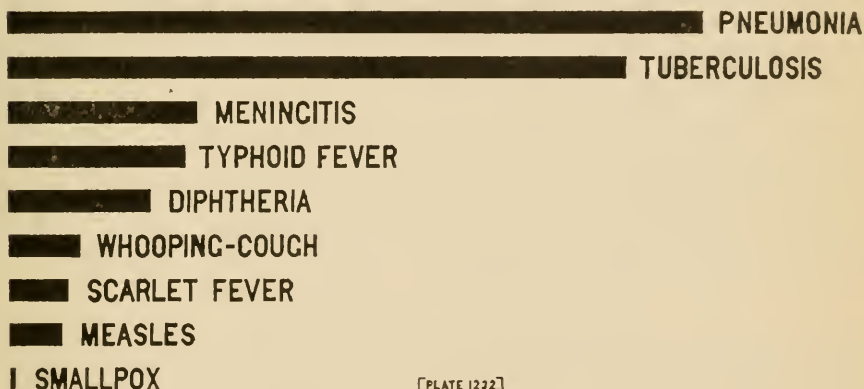
In closing, on behalf of the State Health Department, I desire to commend your society, and especially your committee on the Relation of Sewerage and Water Supply to the Public Health, for the very able assistance which you have voluntarily rendered in the education of the people on subjects pertaining to those branches of public health work which properly belong to your profession. I sincerely trust that our future relations may be stronger and more intimate, and that our united efforts may speedily result in a satisfactory solution of the question to which I have made brief reference, and of many other problems which have an important bearing upon the health and well being of the inhabitants of this Commonwealth.

COMMUNICABLE DISEASES IN MICHIGAN DURING THE YEAR ENDING DECEMBER, 31, 1905, AND IN PRECEDING YEARS.

INTRODUCTION.

This article is the twenty-fifth in a series upon the same general subject, begun in 1882. It presents a summary of the compilation of the reports received from health officers relative to certain communicable diseases in Michigan during the year 1905, together with a review of some of the information obtained from similar compilations in preceding years. The most dangerous diseases are treated in detail in the order of their importance as causes of deaths, as shown by the diagram below:

DEATHS IN MICHIGAN 6 YEARS, 1898-1903.



[PLATE 1222]

SOME OF THE PURPOSES OF THIS COMPILATION.

In the law establishing the State Board of Health, the Secretary of the Board is required to collect information concerning vital statistics and knowledge respecting diseases, and to disseminate such information among the people. In compliance with this requirement, it has heretofore been the custom to collect, compile, tabulate and publish information relative to the causes, and methods of prevention and restriction, of the dangerous communicable diseases, under the following general heads: The diseases which cause the most sickness and deaths; The general prevalence of each disease; The methods of communication, periods of incubation and duration of sickness, of each disease; The season of the year when each disease is usually most prevalent or likely to be contracted; The ages at which persons usually die from or are liable to contract these diseases; The comparative susceptibility of the sexes to contraction of each disease; The localities in this State where the several diseases are known to be the most prevalent;

The comparative prevalence of each disease in urban and rural districts; The death rates and sickness rates of each disease; The prevention and restriction of each disease by isolation and disinfection, coupled with vaccination in smallpox and antitoxin treatment in diphtheria and The beneficial results of preventive and restrictive measures.

For the reason that the information already obtained from the study of certain phases of these diseases during a long series of years is believed to be sufficient for the purposes of this compilation, departures have been made in this article from the usual form of the tabular work in similar articles in preceding reports. For example, the period of incubation, duration of sickness, and age influence, of many of the most prominent diseases have been well established, by the statistics of this Department, by contemporaneous observations in other departments of public health work, and by medical and scientific research, therefore the study of these phases of many of the diseases was discontinued with the annual report for 1905.

METHODS OF COMPILATION.

With the exception of pneumonia, consumption, meningitis and typhoid fever, which have been studied by individual cases, and of diphtheria, which has been studied by households, the diseases have been compiled by outbreaks, as defined in the following paragraph:

An *outbreak* is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over sixty days has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak is considered as ended—unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the latter cases are considered as part of the same outbreak.

GENERAL PLAN OF THE REPORTS.

Upon the receipt of information at this office that tuberculosis, diphtheria, typhoid fever, scarlet fever, measles, whooping-cough, meningitis, smallpox, German measles (rötheln), rabies or glanders, was present, or had recently been present, in any locality in the State, a letter was sent to the health officer, or, in his absence, to the president of the board of health, mentioning the reported existence of the disease within his jurisdiction, indicating his duties and powers, and the proper measures to be taken in restricting the disease, transmitting documents of instruction relative to the prevention and restriction of the disease for distribution among the neighbors of families in which the disease is present, and asking for reports relative to the methods employed for the restriction of the disease, the results of efforts for suppressing it, and the number of cases and deaths in each outbreak. With this letter, in each instance, except in the case of rabies and glanders, there was sent a sufficient number of blanks for the preliminary report, and also for weekly reports during the continuance of the outbreak. At the close of each outbreak, a blank for a special final report was sent, and at the close of the year an annual report, covering all the cases and deaths in each outbreak during the year, was asked for on blanks sent from this office.

The information contained in the several reports, together with other correspondence relative to outbreaks of such diseases, are the bases on which the statements made in this article are founded.

PNEUMONIA IN MICHIGAN IN 1905 AND IN THE PRECEDING YEAR.

GENERAL PREVALENCE.

Table 1 shows that in 1905 the numbers of cases and deaths from pneumonia were considerably less than in the preceding year. It is believed that, in both years, many cases of this disease were not reported either to the local health officials or to this Department, and it is known that only the fatal cases were reported by the health officers of Detroit and Grand Rapids, therefore the numbers of cases shown in the table are much too small. Notwithstanding the efforts put forth by this Department in the past two years for the proper recognition of the dangerous character of this disease, many physicians fail to recognize the necessity for reporting cases under their care to the local health officials. It frequently happens that the first information of cases of pneumonia is received by this Department from the deaths returned to the Secretary of State, and by the time this Department has been able to notify the local health officials of the occurrence of the cases, it is too late for them to take the necessary measures for the restriction of the disease.

Pending a more general recognition of the fact of the communicability of pneumonia, local boards of health should require from physicians and householders reports relative to every case of this disease in their jurisdictions, and should take all precautions necessary for the restriction and prevention of the disease.

TABLE 1.—*The prevalence of pneumonia, in Michigan, in each of the two years, 1904-5.*

Years.	Population.	Number of cases.*	Number of deaths.	Deaths per 100,000 of the population.
1904.....	2,530,016	3,790	2,903	114.7
1905.....	†2,557,275	3,227	2,636	102.1
Annual averages.....	2,543,646	3,509	2,770	108.9

*From Detroit and Grand Rapids, and probably many other localities, only the fatal cases were reported, so that the figures in this column do not represent the numbers of cases which actually occurred.

†Estimated.

GEOGRAPHICAL DISTRIBUTION.

In the consideration of this phase of the study of pneumonia, the State was divided into eleven geographical divisions,* the counties in each of which would be likely to have somewhat similar climatic conditions. Judging

*The boundaries of the several divisions may be seen by reference to the annual report of the Michigan Department of Health for 1886, pages 201 and 217.

TABLE 2.—*The geographical distribution of pneumonia, in Michigan, in 1904 and 1905, as indicated by the average numbers of cases and deaths, and the average deaths per 100,000 persons living, in each geographical division shown in the table.*

Geographical divisions.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
UPPER PENINSULA DIVISION.	267,300	415	323	120.8
Alger county.....	6,619	11	9	136.0
Baraga county.....	5,202	7	7	134.6
Chippewa county.....	22,224	31	28	126.0
Delta county.....	27,428	46	42	153.1
Dickinson county.....	19,067	14	14	73.4
Gogole county.....	7,367	19	17	250.8
Houghton county.....	71,196	141	103	144.7
Iron county.....	8,917	6	7	78.5
Keweenaw county.....	4,712	14	4	84.9
Luce county.....	3,995	6	6	150.2
MacTinae county.....	8,315	8	6	72.2
Marquette county.....	39,857	54	38	95.3
Menominee county.....	26,393	31	27	102.3
Ontonagon county.....	7,287	16	7	96.1
Schoolcraft county.....	8,721	11	8	91.7
NORTHWESTERN DIVISION.	91,933	143	97	105.5
Benzie county.....	10,928	12	11	100.7
Grand Traverse county.....	23,543	31	22	93.4
Leelanau county.....	10,840	13	9	82.9
Manistee county.....	27,088	46	30	110.7
Wexford county.....	19,514	41	25	128.1
NORTHERN DIVISION.	86,729	117	83	95.7
Antrim county.....	15,541	23	22	141.6
Charlevoix county.....	16,569	21	12	72.4
Cheboygan county.....	17,474	24	15	85.8
Crawford county.....	3,968	7	3	75.6
Emmet county.....	18,137	20	15	82.7
Kalkaska county.....	7,668	9	7	91.3
Otsego county.....	7,572	13	9	122.1
NORTHEASTERN DIVISION.	62,105	66	52	83.7
Alcona county.....	5,083	8	4	70.4
Alpena county.....	19,935	17	16	80.3
Iosco county.....	10,577	8	7	66.2
Montmorency county.....	3,550	5	4	112.7
Ogemaw county.....	9,291	16	12	129.2
Oscoda county.....	1,941	4	2	103.0
Presque Isle county.....	11,128	8	7	62.9
WESTERN DIVISION.	280,586	370	313	111.6
Kent county.....	139,585	202	178	127.5
Lake county.....	5,005	3	3	59.9
Mason county.....	19,499	33	25	126.9
Muskegon county.....	37,415	53	44	117.6
Newaygo county.....	18,515	17	10	54.0
Oceana county.....	17,851	23	21	117.6
Ottawa county.....	42,516	39	32	75.3
NORTHERN CENTRAL DIVISION.	108,099	157	106	98.1
Clare county.....	9,293	15	9	96.8
Gladwin county.....	8,856	7	6	67.8
Isabella county.....	24,272	38	24	98.9
Neenota county.....	20,157	31	22	109.1
Midland county.....	14,666	15	12	81.8
Missaukee county.....	10,386	12	11	105.9
Oscoda county.....	18,745	26	17	90.7
Roseconnon county.....	1,724	13	5	290.0

*This footnote is below Table 1, on a preceding page.

TABLE 2.—CONCLUDED.

Geographical divisions.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
BAY AND EASTERN DIVISION.	348,556	450	352	101.0
Arenac county.....	10,230	13	14	136.9
Bay county.....	63,582	75	58	91.2
Huron county.....	35,043	28	26	74.2
Lapeer county.....	26,976	53	38	140.9
Saginaw county.....	86,227	93	83	96.3
Sanilac county.....	34,844	51	37	106.2
St. Clair county.....	55,684	84	61	109.5
Tuscola county.....	35,970	53	35	97.3
CENTRAL DIVISION.	315,540	453	324	102.7
Barry county.....	21,964	27	21	95.6
Clinton county.....	25,217	33	16	63.4
Eaton county.....	30,586	66	47	153.7
Genesee county.....	42,872	65	52	121.3
Gratiot county.....	30,617	35	30	98.0
Ingham county.....	44,081	73	45	102.1
Ionia county.....	34,665	56	40	115.4
Livingston county.....	18,522	21	15	81.0
Montcalm county.....	33,324	37	31	93.0
Shiawassee county.....	33,692	40	27	80.1
SOUTHWESTERN DIVISION.	143,485	162	117	81.5
Allegan county.....	38,965	43	34	87.3
Berrien county.....	49,418	46	34	68.8
Cass county.....	19,925	19	11	55.2
Van Buren county.....	35,177	54	38	108.0
SOUTHERN CENTRAL DIVISION.	325,885	472	335	102.8
Branch county.....	26,221	26	22	83.9
Calhoun county.....	53,419	76	59	110.4
Hillsdale county.....	29,834	31	22	73.7
Jackson county.....	46,985	107	57	121.3
Kalamazoo county.....	50,444	98	63	124.9
Lenawee county.....	49,184	59	47	95.6
St. Joseph county.....	23,145	19	19	82.1
Washtenaw county.....	46,653	56	46	98.6
SOUTHEASTERN DIVISION.	503,467	723	692	137.4
Macomb county.....	33,077	35	25	75.6
Monroe county.....	32,942	53	48	145.7
Oakland county.....	45,866	68	56	122.1
Wayne county.....	391,582	567	563	143.8

*This footnote is below Table 1, on a preceding page.

from the death rates of the several divisions, shown in Table 2, pneumonia was most prevalent in the Southeastern Division, Upper Peninsular Division and Western Division and least prevalent in the Southwestern Division. Arranging the divisions in the order of greatest death rates per 100,000 of the population, we have the Southeastern (137.4), Upper Peninsula (120.8), Western (111.6), Northwestern (105.5), Southern Central (102.8), Central (102.7), Bay and Eastern (101.0), Northern Central (98.1), Northern (95.7), Northeastern (83.7), and Southwestern (81.5). The counties having the highest and lowest death rates were Roscommon (290.0) and Newaygo (54.0). Compared with the average death rate for the State as a whole (108.9), the counties in which the disease was unusually prevalent during the two years, 1904-1905, are—Gogebic (230.8), Eaton (153.7), Delta (153.1), Luce (150.2), Monroe (145.7), Houghton (144.7), Wayne

(143.8), Antrim (141.6), Lapeer (140.9), Arenac (136.9), Alger (136.0) and Baraga (134.6).

LOCAL PREVALENCE.

Of the 1,640 incorporated localities in Michigan in 1905, 968, or about 59 per cent, were, at some time during the year, infected with pneumonia. As shown in Table 3, the greatest prevalence occurred in the cities and villages—urban localities—the death rate being 112.8 per 100,000, as compared with 92.2 per 100,000 in the townships—rural localities. To determine what, if any, influence density of population had on the prevalence of pneumonia, the cities and villages have been divided into five groups, the death rate in each group being as follows: Cities over 50,000 population, 125.9 per 100,000; cities from 25,000 to 50,000, 100.9 per 100,000; cities, and Calumet township, from 10,000 to 25,000, 120.0 per 100,000; cities and villages from 5,000 to 10,000, 97.5 per 100,000; and cities and villages under 5,000, 103.7 per 100,000. By this it may be seen that the death rate was highest in cities over 50,000, and the lowest in cities and villages of from 5,000 to 10,000 population.

As indicated by the death rates, the largest cities and villages in which pneumonia was much more prevalent than the average for the entire State in 1905 (103.1 per 100,000 of the population) were: Wyandotte (with a death rate of 218.7 per 100,000), Hancock (199.0), Pontiac (197.1), Muskegon (172.1), Sault Ste. Marie (171.4), Escanaba (165.4), Cadillac (154.6), Port Huron (158.1), Monroe (156.3), Ludington (151.1), Flint (150.0), Kalamazoo (144.6), Manistee (138.0) and Detroit (131.2).

TABLE 3.—*The prevalence of pneumonia in urban and rural localities, in Michigan, in 1905.*

Localities—Grouped according to density of population.	Estimated population.	Health jurisdictions.			Cases.*	Deaths.	Death rates per 100,000 of the population.
		Total.	Infected.				
			Number.	Per cent of all jurisdictions.			
Cities over 50,000.....	423,319	2	2	100	546	533	125.9
Cities from 25,000 to 50,000.....	144,748	4	4	100	187	146	100.9
Cities from 10,000 to 25,000 and Calumet Twp., (17,518).....	257,596	18	18	100	381	309	120.0
Cities and villages from 5,000 to 10,000†.....	147,649	23	23	100	179	144	97.5
Cities and villages under 5,000†.....	375,013	364	213	59	507	389	103.7
Total urban.....	1,348,325	411	260	63	1,800	1,521	112.8
Balance of localities—principally townships‡....	1,208,950	1,229	708	58	1,427	1,115	92.2

*This footnote is below Table 1, on a preceding page.

†Exclusive of twenty-seven villages in the two groups, for which the populations in 1905 cannot be correctly estimated.

‡Includes the twenty-seven villages mentioned in the preceding paragraph, but does not include Calumet township, which, for the purpose of this study, is included in the third group of urban localities, which have corresponding populations.

SEASONAL PREVALENCE.

Judging from the average numbers of persons who were taken sick in each month in 1904 and 1905, as shown in Table 4, pneumonia was most prevalent in the month of February, and least prevalent in the month of August. By the Secretary of State's Vital Statistics of Michigan, it appears that during the eight years, 1898-1905, the greatest number of deaths from pneumonia occurred in the months of February and March, and the smallest number in August. The months of greatest prevalence are from December to May, both inclusive.

TABLE 4.—*The seasonal prevalence of pneumonia, in Michigan, as indicated by the average numbers of persons taken sick in each month in 1904-5, and by the average numbers of deaths, from this disease, in each month in the eight years, 1898-1905.*

Years.		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904-5.	Average numbers of persons taken sick in each month*...	498	550	403	300	236	96	67	47	75	119	210	308
1898-1905.	Average numbers of deaths in each month†.....	344	402	384	311	227	117	69	61	76	112	164	250

*The months in which some of the cases began were not reported.

†The averages for the years 1898-1903 are compiled from the Secretary of State's Vital Statistics of Michigan, and for the years 1904-5, from the Michigan Monthly Bulletin of Vital Statistics.

INFLUENCE OF AGE AND SEX, 1904-5.

The ages of those taken sick with pneumonia in 1904 and 1905 were stated in 6,706 instances.

In the case of those who died from pneumonia, the ages were stated in 5,377 instances, and of this number 25 per cent were under one year; 37 per cent under 5 years; 46 per cent from the time of birth up to and including the twenty-fourth year; 16 per cent from 25 to 49 years, both inclusive; 25 per cent from 50 to 74 years, both inclusive; and 12 per cent 75 years and over.

The numbers and per cents of cases and deaths, by one year periods from 0 to 5 years, and by five year periods from 5 to 75 years, are contained in Table 5.

The average age of non-fatal cases was for males 26.6 years, and for females 29.8 years.

The average age of fatal cases was for males 31.9, and for females 34.2 years.

Thirty-eight per cent of the males and 36 per cent of the females who died, and 17 per cent of the males and 17 per cent of the females who recovered, were under five years of age.

Ten per cent of the males and 15 per cent of the females who died, and 2 per cent of the males and 4 per cent of the females who recovered, were over 74 years of age.

Up to the second year and between the ages of 15 and 59 years, inclusive, the fatality was slightly higher in the males than in the females. Up to the second year and between the ages of 4 and 59 years, inclusive, the recoveries were more numerous in the males than in the females.

TABLE 5.—*The influence of age and sex in pneumonia, as indicated by the numbers of those of known ages, who died or recovered from this disease, in the two years, 1904-5. Arranged by sex, in age periods of one year, up to and including the fifth year; from 5 years to 74 years, inclusive, in five year periods; and over 75 years in one group.*

Age periods.	Died.									Recovered.					
	Total deaths.			Per cent of all deaths.			Average deaths per year.			Total recoveries.			Average recoveries per year.		
	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.
0-1 years.....	761	562	1,323	14.15	10.45	24.60	381	281	662	36	22	58	18	11	29
1-2 years.....	203	197	400	3.78	3.66	7.44	102	99	200	28	24	52	14	12	26
2-3 years.....	60	70	130	1.12	1.30	2.42	30	35	65	18	27	45	9	14	23
3-4 years.....	31	41	72	.58	.76	1.34	16	21	36	25	18	43	13	9	22
4-5 years.....	23	37	60	.43	.69	1.12	12	19	30	19	7	26	10	4	13
Under 5 years.....	1,078	907	1,985	20.05	16.87	36.92	539	454	993	126	98	224	63	49	112
5-9 years.....	58	72	130	1.08	1.34	2.42	29	36	65	75	67	142	38	34	71
10-14 years.....	33	45	78	.61	.84	1.45	17	23	39	66	47	113	33	24	57
15-19 years.....	81	62	143	1.51	1.15	2.66	41	31	72	89	38	127	45	19	64
20-24 years.....	88	70	158	1.64	1.30	2.94	44	35	79	64	24	88	32	12	44
25-29 years.....	78	77	155	1.45	1.43	2.88	39	39	78	41	26	67	21	13	34
30-34 years.....	111	62	173	2.06	1.15	3.21	56	31	87	36	31	67	18	16	34
35-39 years.....	97	66	163	1.80	1.23	3.03	49	33	82	48	25	73	24	13	37
40-44 years.....	120	66	186	2.23	1.23	3.46	60	33	93	45	33	78	23	17	39
45-49 years.....	119	68	187	2.21	1.27	3.48	60	34	94	44	39	83	22	20	42
50-54 years.....	125	72	197	2.32	1.34	3.66	63	36	99	33	27	60	17	14	30
55-59 years.....	137	110	247	2.55	2.05	4.60	69	55	124	24	19	43	12	10	22
60-64 years.....	140	140	280	2.60	2.60	5.20	70	70	140	20	29	49	10	15	25
65-69 years.....	148	153	301	2.75	2.85	5.60	74	77	151	16	24	40	8	12	20
70-74 years.....	154	174	328	2.86	3.24	6.10	77	87	164	18	20	38	9	10	19
75 years and over.....	299	367	666	5.56	6.83	12.39	150	184	333	17	26	37	9	10	19
	2,866	2,511	5,377	53.30	46.70	100.00	.....	.....	.....	762	567	1329	.....	.....	.....

DURATION OF FATAL AND NON-FATAL CASES, 1904-5.

The average duration of fatal cases was for males 8.0 days, and for females 8.2 days.

The average duration of non-fatal cases was for males 15.7 days, and for females 16.6 days.

Of the fatal cases, the greatest numbers of deaths, both male and female, occurred between the fifth and eleventh days; the next greatest number before the sixth day, and the next, between the tenth and sixteenth days.

Of the non-fatal cases, the greatest number of recoveries, both male and female, took place between the tenth and twenty-first days.

The per cents of deaths and recoveries, both male and female, in five day periods, are shown in Table 6.

TABLE 6.—*The duration of sickness in fatal and non-fatal cases of pneumonia, during the years 1904-5. Arranged by sex in five year periods.*

Duration periods.	Fatal cases.						Non-fatal cases.					
	Numbers.			Per cent of all cases of known duration.			Numbers.			Per cent of all cases of known duration.*		
	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.
1 to 5 days....	838	701	1,539	19.16	16.03	35.19	14	14	28	1.24	1.24	2.48
6 to 10 days....	880	788	1,668	20.12	18.02	38.14	107	70	177	9.50	6.22	15.72
11 to 15 days....	320	252	572	7.32	5.76	13.08	159	108	267	14.12	9.50	23.71
16 to 20 days....	116	101	217	2.65	2.31	4.96	147	115	262	13.06	10.21	23.27
21 to 25 days....	57	71	128	1.30	1.62	2.92	83	85	168	7.37	7.55	14.92
26 to 30 days....	41	30	71	.94	.68	1.62	37	37	74	3.28	3.20	6.57
31 days and over	91	88	179	2.08	2.01	4.09	96	54	150	8.53	4.80	13.33
Totals	2,343	2,031	4,374	53.57	46.44	100.00	643	483	1,126	57.10	42.90	100.00

PREDISPOSING INFLUENCES, 1904-5.

In reply to the question, "Did this disease begin as a 'bad cold,' influenza, bronchitis, or as pneumonia?" 1,928 cases were reported to have begun as a "bad cold;" 307 cases following influenza; 234 cases following bronchitis, and 217 cases following exposure.

These and other predisposing influences are shown in Table 7, and this table may well be studied in connection with Tables 8 and 18, on subsequent pages.

TABLE 7.—*Predisposing influences in pneumonia, as indicated by the manner in which the disease began in 1904-5.*

Disease began as or followed:	Number of instances.	Disease began as or followed:	Number of instances.
Bad cold.....	1,928	Convulsions.....	2
Influenza.....	307	Operation.....	2
Bronchitis.....	234	Rheumatism.....	2
Exposure.....	217	Non-acclimated.....	2
Measles.....	37	Dropsey.....	2
Whooping-cough.....	28	Apoplexy.....	2
Pleurisy.....	20	Inflammation of bowels.....	1
Traumatism.....	13	Anemia.....	1
General debility.....	13	Sepsis.....	1
Tonsillitis.....	9	Adenoids.....	1
Typhoid fever.....	8	Gastro enteritis.....	1
Confinement.....	7	Mumps.....	1
Asthma.....	7	Appendicitis.....	1
Alcoholism.....	6	Pulmonary abscess.....	1
Sporadic.....	5	Kidney trouble.....	1
Croup.....	4	Atmospheric conditions.....	1
Insanitary conditions.....	3	Eczema.....	1
Paralysis.....	3	Malarial fever.....	1
Diphtheria.....	3	Chronic nephritis.....	1
Heart disease.....	3	Catarrh of stomach.....	1
Throat trouble.....	3	Cholera infantum.....	1
Jaundice.....	2	Tuberculosis of larynx.....	1
Hemorrhage of lungs.....	2		

REPORTED SOURCES OF CONTAGIUM, 1904-5.

The information contained in the reports of health officers relative to the sources of the contagium in pneumonia is very meagre, probably on account of the difficulty met with in tracing cases of this disease to their source.

Out of 76 cases, about the source of which definite statements were made, 64 were reported as contracted while nursing, or otherwise coming in contact with pneumonia patients.

TABLE 8.—*Reported sources of contagium in pneumonia, in Michigan, in 1904-5.*

Sources.	Number of instances.
Contracted while nursing, or otherwise coming in contact with pneumonia patients.....	64
Handling mail.....	1
From outside jurisdictions.....	8
Foreign bodies in bronchial tubes.....	3

Other reported sources of contagium are shown in Table 8, and this table may well be studied in connection with Table 7, on a preceding page.

PERIOD OF INCUBATION, 1904-5.

By reason of the difficulty experienced in locating individual sources of contagium, and, by this means, the time of exposure to the disease, the period of incubation is not easy to determine. As indicating the probable average period of incubation for the two years, 1904 and 1905, it may be stated that, in the majority of instances, the time which elapsed between certain cases and recent previous cases in the same families was seven days.

The periods of time between the occurrence of one hundred and sixteen cases of pneumonia, in 1904 and 1905, and previous cases in the same families is shown in Table 9. The table may also be of service in studying the questions of *communicability* in pneumonia and the *susceptibility* of persons who have had the disease to future attacks.

TABLE 9.—*The COMMUNICABILITY of pneumonia, as probably indicated by the number of contemporary cases in the same families; the PERIODS OF INCUBATION in pneumonia, as probably indicated by the time which elapsed between the occurrence of certain cases of this disease and recent previous cases in the same families; and the SUSCEPTIBILITY of certain persons to pneumonia, as probably indicated by the numbers of instances in which second, and even third, attacks occurred in the same persons, in Michigan, in 1904-5.*

Time of occurrence of secondary cases in the same family	Number of instances.	Time of occurrence of secondary cases in the same family.	Number of instances.
About the same time.....	10	Twenty-seven days.....	1
Twelve hours.....	1	One month.....	6
One day.....	3	One month and 15 days.....	2
Two days.....	7	Two months.....	2
Three days.....	5	Three months.....	2
Four days.....	7	Five months.....	1
Five days.....	2	Eight months.....	1
Six days.....	3	Eleven months.....	1
Seven days.....	9	One year.....	* 19
Eight days.....	2	One year and 7 months.....	† 3
Nine days.....	1	Two years.....	‡ 11
Ten days.....	2	Three years.....	7
Eleven days.....	3	Three years and six months.....	1
Nineteen days.....	2	Four years.....	2
Twenty-one days.....	2	Five years.....	§ 7
Twenty-two days.....	1	Time not stated.....	41

*In three instances, a second attack in the same person.

†In one instance, a second attack in the same person.

‡In three instances, a second attack in the same person.

§In one instance, a second attack, and in another instance, a third attack, in the same person, in the five years.

INFLUENCE OF OCCUPATION, 1904-5.

The occupations of pneumonia patients in 1904 and 1905 were given in 2,844 instances, and of this number at least 2,491 were engaged in occupations which, it is believed, exposed them, or rendered them susceptible, to this disease.

Heading the list are those engaged in housework—housewives, housekeepers and domestics—to the number of 1,055, many of whom spend a considerable portion of their time in ill ventilated and dust laden rooms. Dirt—often contaminated with infected sputum—carried into the home on the shoes and skirts, and disseminated throughout the rooms by air currents, or by the periodical sweeping and dusting, is generally believed to play a very important part in the spread of pneumonia, and other diseases of the respiratory organs.

TABLE 10.—*The influence of occupation in pneumonia, in 1904-5.*

Occupations.	Number of instances.	Occupations.	Number of instances.	Occupations.	Number of instances.
Housewife.....	1,055	Cook.....	7	Laundryman.....	1
Farmer.....	650	Sailor.....	7	Dentist.....	1
Laborer.....	364	Cigar maker.....	6	Woodworker.....	1
Student.....	182	Hotel keeper.....	6	Cattle buyer.....	1
Mechanic.....	93	Contractor.....	6	Butter maker.....	1
Merchant.....	77	Liveryman.....	6	Bean picker.....	1
Store clerk.....	32	Legal profession.....	6	Hunter.....	1
Office clerk.....	31	Dressmaker or seamstress.....	6	Soldier.....	1
Miner.....	31	Harness maker.....	5	Surface foreman.....	1
Teamster.....	30	Tailor.....	5	Stone cutter.....	1
Railroad man.....	22	Milliner.....	4	Well digger.....	1
Painter.....	20	Night watchman.....	4	Surveyor.....	1
Agent.....	16	Mail carrier.....	3	Marine engineer.....	1
Wood-man.....	15	Barber.....	3	Theatrical man.....	1
School teacher.....	13	Washerwoman.....	3	Book binder.....	1
Minister.....	12	Street car conductor.....	3	Architect.....	1
Factory employe.....	10	Fisherman.....	3	Baker.....	1
Gardener or florist.....	10	Policeman.....	3	Butcher.....	1
Lumberman.....	9	Hotel porter.....	2	Carpet weaver.....	1
Nurse.....	8	Real estate man.....	2	Elevator boy.....	1
Shoemaker.....	8	Tanner.....	2	Hair dresser.....	1
Miller.....	8	Attendant in prison or asylum.....	2	Inspector.....	1
Bartender.....	8	Printer.....	2	Messenger.....	1
Physician.....	8	Musician.....	2	Plasterer.....	1
Janitor.....	7	Tinner.....	2	Upholsterer.....	1

Next in order are the farming class, to the number of 650, who, though naturally a hardy race, and living under conditions which tend to health and vigor, seem to be very susceptible to this disease.

Next in order are the laboring class, with 364 cases, and next to them the student class—principally young children of school age—with 182 cases.

In 1905, there were 939 cases where the ages of the patients were given as under 5, therefore no occupation was given, and they were still too young to attend school, so could not be included in the student class.

A complete list of the occupations of pneumonia patients, as reported in the two years, 1904-1905, may be found in Table 10.

RESTRICTIVE AND PREVENTIVE MEASURES, 1904-5.

By reference to Table 11 it will be seen that of the total number of cases of pneumonia in 1904-1905, but 1,401, or 20 per cent, were isolated from all persons except nurses and attending physicians; in 2,221 instances, or 32 per cent of the whole number, the sputa was disinfected or destroyed, and in 2,034 instances, or 29 per cent of the whole number, the rooms occupied by pneumonia patients were disinfected.

As there are a large number of instances in which this Department received its first information of cases that occurred through the death returns, of which cases the health officials had no previous knowledge, until notified by this Department, it was then too late to carry out the restrictive and preventive measures in those cases. This will account for the comparatively small number of cases in which the restrictive and preventive measures were carried out.

TABLE 11.—*Restrictive and preventive measures in pneumonia, in Michigan, in 1904-5.*

Years.	The numbers of cases in which the restrictive and preventive measures were reported as complete.		
	Isolation.	Disinfection of sputa.	Disinfection of rooms.
1904.....	698	1,191	987
1905.....	703	1,030	1,047
Per cent of all cases.....	20.0	31.7	29.0

TUBERCULOSIS IN MICHIGAN IN 1905 AND PRECEDING YEARS.

GENERAL PREVALENCE.

During the year 1905, tuberculosis was reported present at 845 incorporated health jurisdictions in this State, with an aggregate of 2,590 cases, including 2,464 deaths.

The word "cases," as used in this article, includes only the cases of which this Department received the first report, during any one year, and is not intended to include the actual number of cases which began or were present in any year.

There were still sick at the close of the year 343 persons, of whose sickness information had been received by this Department from time to time during the year. There were also a number of persons still sick at various times during the year, but of whom the Department received no information at the close of the year. Some of them may have recovered prior to December 31.

By reason of the fact that many cases of this disease are of long duration, and in some stages of the disease not under the care of a physician, the number of reports received by this Department are believed to be considerably less than the actual number of cases which occurred.

From many localities the deaths only from tuberculosis are reported, therefore, the apparent rates of deaths to cases are much too high.

In this article, the deaths reported to the Secretary of State are used in the several tables in conjunction with those reported to this Department.

The compilation of information relative to the prevalence of tuberculosis in Michigan was made for the first time in 1893, but from that time to 1898, when the new law for the registration of deaths took effect, the reports were much less than the actual numbers of cases and deaths which occurred. Hence the reason for commencing Table 12 with the year 1898.

The number of deaths from pulmonary tuberculosis per 100,000 persons living, reported to the Secretary of State during the twenty-nine years, ending with 1897 (Table 13), probably quite accurately represents the annual fluctuations of, but not the total deaths from, this disease. It may be seen that, compared with any previous year, there was a remarkable and unprecedented decrease in the death rate from this disease in 1891, and the decrease occurred at a time when influenza was epidemic in the country. Statistics for the Eastern States at that time showed an increase in the death rates from tuberculosis, which increase was attributed to the influence of the epidemic influenza.

The decrease in tuberculosis in Michigan has apparently resulted from the education of the people to a knowledge that tuberculosis is a dangerous communicable disease, which may easily be restricted. It is one more forcible illustration of the fact that "Knowledge is Power." Knowledge of the modes whereby tuberculosis is usually spread, and of the ease with which its spread may be lessened, by the destruction or disinfection of all infected sputa, has apparently supplied a "power" which has caused an unprecedented reduction in the death rate from tuberculosis. The extent of the "campaign of education" which, in Michigan, began in 1880, and which took on an especially vigorous activity in 1891, can hardly

be realized without a study of its history; but the apparent results of that educational movement are exceedingly plain to be seen from Table 13.

Some of the reasons for believing that the decrease in the death rate from tuberculosis has been due to the popular education in the way the disease is usually spread, and in the way to restrict the disease are: 1. The disease was under observation for many years before that knowledge became general, and (as shown by Table 13) it did not decrease; the decrease has been nearly coincident with the education, lagging behind somewhat at the outset, and gradually increasing later, as it would be expected to do if caused by the popular education. 2. Precisely similar decrease occurred in Michigan in the death rate from scarlet fever and from other diseases, coincident with systematic popular education in the ways those diseases are usually spread, and in the best measures for their restriction. 3. The decrease in the mortality from tuberculosis has, apparently, been greatest in those States where systematic popular education for its restriction has been most general and active. 4. There is no other known cause capable of producing such a gradually increasing effect as is shown to have occurred.

As showing the comparative prevalence of tuberculosis in Michigan and in other states and countries, the following extract from the Michigan Monthly Bulletin of Vital Statistics for July, 1905, may be of interest:

MORTALITY FROM TUBERCULOSIS IN MICHIGAN FOR FIVE YEARS, 1900-04.*

* * * * *

Following are the rates for pulmonary tuberculosis alone, as originally compiled in the BULLETINS: 1900, 75.6; 1901, 86.1; 1902, 82.4; 1903, 84.8; 1904, 89.3. These figures are comparable with the rates for some foreign countries for the year 1902 as computed from figures given in the last report of the Registrar-General of England: England and Wales, 123.3; Scotland, 145.0; Ireland, 212.1; Norway, 189.7; German Empire, 187.7; Netherlands, 132.5; Belgium, 131.6; Switzerland, 187.0; Spain, 186.2; Italy, 108.8; New South Wales, 82.7; Victoria, 116.6; New Zealand, 77.3. Total tuberculosis: England and Wales, 174.1; Prussia, 189.0; Hungary, 383.7.

According to the last U. S. Census (Vol. III, p. clxxvii), Michigan was far in advance of any other registration State in the matter of a low death rate from consumption. Here are the figures for 1900: Connecticut, 168.3; District of Columbia, 305.3; Maine, 164.9; Massachusetts, 186.2; **Michigan, 100.7**; New Hampshire, 152.3; New Jersey, 180.1; New York, 194.1; Rhode Island, 195.3; Vermont, 152.5; total registration States, 175.9. The rate for Michigan cities was 116.7 and for the rural part of the State it was 94.1 per 100,000, both far below the corresponding figures for any other State. It would seem from such statistics as these that Michigan is most favorably situated with respect to mortality from tuberculosis, and that the State in fact constitutes a great natural sanatorium for this disease.

This conclusion and the fact that consumption does not usually diminish, as is quite commonly supposed by the people, as we pass from North to South, are indicated by statistics given in Bulletin 15, "A Discussion of the Vital Statistics of the Twelfth Census." For the eleven-year period 1890-1900, the average annual death rates per 100,000 population were as follows: cities in New England States, 244; cities in Middle States, 259; cities in Lake States (not including Detroit), 156; cities in Southern States, 277; cities in Western Central States, 183; San Francisco, Cal., 304. The rates of the Lake cities in 1900 were, for Buffalo, 120; Chicago, 153; Cleveland, 126; Milwaukee, 131; Toledo, 137; to which we may compare Detroit, 115.9 and a rate of 127.2 for the five years since. No other cities in the United States with the possible exception of Omaha, can compare with the Lake group, and no other cities of equal size in the world can begin to approach them. The State of Michigan, "girdled with its zone of inland seas," should and does show an even more favorable condition with respect to tuberculosis, and may be the first great community in all the world to realize the sanitarian's prophetic vision of the extermination of the "Great White Plague."

*Extracted from the Michigan Monthly Bulletin of Vital Statistics, July, 1905.

TABLE 12.—*The prevalence of tuberculosis, in Michigan, in each of the eight years, 1898-1905.*

Years.	Population.	Number of cases.*	Number of deaths.	Deaths per 100,000 population.
1898.....	†2,389,393	3,041	2,728	114.2
1899.....	†2,426,331	2,975	2,516	103.7
1900.....	2,420,982	2,721	2,221	91.7
1901.....	†2,448,241	2,915	2,344	95.7
1902.....	†2,475,499	2,658	2,185	88.3
1903.....	†2,502,758	2,745	2,319	92.7
1904.....	2,530,016	2,928	2,515	99.4
1905.....	†2,557,275	2,596	2,464	96.4
Average per year.....	2,468,812	2,822	2,412	97.7

*From Detroit and Grand Rapids, and probably many other localities, only the fatal cases were reported, so that the figures in this column do not represent the number of cases which actually occurred.

†Estimated.

TABLE 13.—*The number of reported deaths from tuberculosis of the lungs per 100,000 persons living, in Michigan, in each of the twenty-nine years, 1869-1897. Compiled from the Secretary of State's Vital Statistics of Michigan.*

Year.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.
Deaths.....	108.1	122.5	106.0	115.1	109.6	102.0	104.9	109.2	110.0	106.1	105.6	111.7
Year.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.
Deaths.....	116.1	104.4	112.3	120.8	105.3	107.3	108.7	121.0	104.3	105.4	96.3	95.2
Year.	1893.	1894.	1895.	1896.	1897.	Average, 1869-1897.						
Deaths.....	97.7	98.4	105.1	90.4	80.6	106.2						

GEOGRAPHICAL DISTRIBUTION OF TUBERCULOSIS IN THE EIGHT YEARS, 1898-1905.

By Table 14 it may be seen that, as indicated by the average death rates for the entire State (shown in Table 12), the disease was much more prevalent than the average in the counties of Mackinac, Rosecommon, Wayne and Grand Traverse.

In a lesser degree, the disease was more prevalent than the average in the counties of Delta, Houghton, Macomb, Benzie, Leelanau, Kent, Keweenaw, Marquette, St. Joseph, Alcona, Kalamazoo, Muskegon, Washtenaw, Mason and Baraga.

TABLE 14.—*The geographical distribution of tuberculosis, in Michigan, in the eight years, 1898-1905, as indicated by the average numbers of cases and deaths, and the average deaths per 100,000 persons living, in each geographical division shown in the table.*

Geographical Divisions.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
UPPER PENINSULA DIVISION.				
	262,117	333	263	100.3
Alger county.....	6,002	5	4	66.6
Baraga county.....	5,002	5	5	100.0
Chippewa county.....	21,132	21	20	94.6
Delta county.....	25,310	37	29	114.6
Dickinson county.....	17,793	18	16	89.9
Gogebie county.....	16,594	15	14	84.4
Houghton county.....	65,201	107	75	115.0
Iron county.....	8,728	8	5	57.3
Keweenaw county.....	3,674	5	4	108.9
Luce county.....	3,216	3	3	93.3
Mackinac county.....	7,675	12	12	156.4
Marquette county.....	40,398	57	44	108.9
Menominee county.....	26,286	23	22	83.7
Ontonagon county.....	6,693	11	5	74.7
Schoolcraft county.....	8,413	6	5	59.4
NORTHWESTERN DIVISION.				
	89,278	115	91	101.9
Benzie county.....	10,502	12	12	113.3
Grand Traverse county.....	22,185	40	27	121.7
Leelanau county.....	10,835	13	12	110.8
Manistee county.....	27,630	32	26	94.1
Wexford county.....	18,036	18	14	77.6
NORTHERN DIVISION.				
	79,731	80	67	84.0
Antrim county.....	15,671	14	12	76.6
Charlevoix county.....	14,699	17	14	95.2
Cheboygan county.....	16,466	15	13	79.0
Crawford county.....	3,234	3	2	61.8
Emmet county.....	16,068	19	16	99.6
Kalkaska county.....	7,118	7	6	84.3
Otsego county.....	6,475	5	4	61.8
NORTHEASTERN DIVISION.				
	57,578	47	43	74.7
Alcona county.....	5,622	6	6	106.7
Alpena county.....	19,421	15	15	77.2
Iosco county.....	10,096	10	9	89.1
Montmorency county.....	3,434	3	3	87.4
Ogemaw county.....	7,884	7	5	63.4
Oscoda county.....	1,722	2	1	58.1
Presque Isle county.....	9,399	4	4	42.6
WESTERN DIVISION.				
	273,647	331	280	102.3
Kent county.....	135,263	183	149	110.2
Lake county.....	5,041	5	5	99.2
Mason county.....	19,681	23	20	101.6
Muskegon county.....	36,510	45	38	104.1
Newaygo county.....	18,007	14	14	77.7
Occana county.....	17,389	16	15	80.3
Ottawa county.....	41,756	45	39	93.4
NORTHERN CENTRAL DIVISION.				
	105,321	100	83	78.9
Clare county.....	8,770	8	6	68.4
Gladwin county.....	7,298	5	4	54.8
Isabella county.....	23,814	25	20	84.0
Mecosta county.....	20,769	21	18	86.7
Midland county.....	14,947	13	13	87.0
Missaukee county.....	9,705	8	5	51.5
Oseola county.....	18,395	20	15	81.5
Rogers county.....	1,623	2	2	123.2

*This footnote is below Table 12, on a preceding page.

TABLE 14.—CONCLUDED.

Geographical Divisions.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
BAY AND EASTERN DIVISION.	346,108	326	204	84.9
Arenac county.....	9,626	6	5	51.9
Bay county.....	63,987	66	61	95.3
Huron county.....	35,096	30	28	79.8
Lapeer county.....	27,500	25	21	76.1
Saginaw county.....	83,344	80	74	88.8
Sanilac county.....	35,071	36	31	88.4
St. Clair county.....	55,315	48	42	75.9
Tuscola county.....	36,089	35	32	88.7
CENTRAL DIVISION.	316,137	343	282	89.2
Barry county.....	22,557	23	17	75.4
Clinton county.....	25,382	24	21	82.7
Eaton county.....	31,602	35	29	91.8
Genesee county.....	42,252	50	40	94.7
Griiot county.....	29,945	32	28	93.5
Ingham county.....	42,131	42	32	76.0
Ionia county.....	35,160	42	35	99.5
Livingston county.....	19,263	21	17	88.3
Montcalm county.....	33,770	32	29	85.9
Shiawassee county.....	34,075	42	34	99.8
SOUTHWESTERN DIVISION.	142,922	159	134	93.8
Allegan county.....	39,034	44	36	92.2
Berrien county.....	49,612	55	49	98.8
Cass county.....	20,617	24	19	92.2
Van Buren county.....	33,659	36	30	89.1
SOUTHERN CENTRAL DIVISION.	322,095	391	315	97.8
Branch county.....	26,583	31	25	94.0
Calhoun county.....	51,681	55	51	98.7
Hillsdale county.....	29,844	34	28	93.8
Jackson county.....	47,708	49	44	92.2
Kalamazoo county.....	47,085	78	50	106.2
Lenawee county.....	48,790	48	43	88.1
St. Joseph county.....	23,803	31	26	109.2
Washtenaw county.....	46,601	65	48	103.0
SOUTHEASTERN DIVISION.	473,892	597	562	118.6
Macomb county.....	33,122	44	38	114.7
Monroe county.....	33,177	40	33	99.5
Oakland county.....	45,113	55	43	95.3
Wayne county.....	362,480	458	448	123.6

*This footnote is below Table 12, on a preceding page.

It was considerably less prevalent than the average in the counties of Presque Isle, Missaukee, Arenac, Gladwin, Iron, Oscoda, Schoolcraft, Crawford, Otsego, Ogemaw, Alger, Clare, Ontonagon, Barry, Lapeer, Ingham, St. Clair, Antrim, Alpena, Newaygo, Wexford and Cheboygan.

By geographical divisions, the disease was more prevalent than the average in the Southeastern, Western, Northwestern, Upper Peninsular and Southern Central divisions; and less prevalent than the average in the Northeastern, Northern Central, Northern, Bay and Eastern, Central and Southwestern divisions.

THE PREVALENCE OF TUBERCULOSIS IN URBAN AND RURAL LOCALITIES.

By reference to the figures in Table 15, which show the per cent of infected localities and the death rates per 100,000 of the population, in 1905,

it will be seen that tuberculosis was most prevalent in the large centers of population, particularly in cities and villages of 5,000 to 10,000.

It may also be seen that the death rates were higher in all localities of more than 5,000 population than the death rate for the entire State, shown in Table 12.

As indicated by the death rates, the localities in which tuberculosis was much more prevalent than the rate for the State in 1905 (96.4 deaths per 100,000 of the population), were: Traverse City (213.8), Escanaba (209.0), Grand Haven (205.1), Hancock (199.0), Marquette (184.9), Holland (183.6), Ishpeming (178.3), Wyandotte (164.1), Manistee (162.3), Petoskey (155.0), Iron Mountain (154.4), Mt. Clemens (151.9), Battle Creek (151.3), Negaunee (147.9), Jackson (146.1), Ann Arbor (136.8), Kalamazoo (134.9), Ypsilanti (130.9), and Calumet township (125.6).

The status of tuberculosis in groups of localities in Michigan, in the five years ending in 1904, is shown by the following extracts from the Michigan Monthly Bulletin of Vital Statistics for July, 1905, but the rates for groups of localities of less than 5,000 population will not be comparable with the rates for corresponding groups in Table 15, because, in the Bulletin article, only cities are included in the group of localities having populations of less than 5,000, while in the Table both cities and villages are included in this group:

*Mortality from Tuberculosis (all forms) in Michigan by cities as compiled in bulletin for five years, 1900-04.**

Cities grouped according to population at State Census of 1904.	Deaths per 100,000 of the population.					
	1904.	1903.	1902.	1901.	1900.	Average.
Cities over 50,000	142.3	127.2	126.1	123.1	113.6	126.8
Cities from 25,000 to 50,000.....	132.2	111.9	102.9	122.1	103.7	114.7
Cities from 10,000 to 25,000.....	106.1	114.8	109.8	112.6	115.8	111.8
Cities from 5,000 to 10,000.....	115.3	112.8	103.3	123.0	114.3	113.7
Cities under 5,000.....	94.1	104.9	84.9	88.2	103.0	95.0
Total urban population.....	123.4	117.9	111.6	116.2	111.7	116.3
Total rural population.....	91.6	86.4	83.9	87.4	89.4	87.7

The average urban rate for tuberculosis, 116.3 per 100,000, markedly exceeds the rural rate, 87.7, although both are far below the usual rates in this country. In general the death rate from tuberculosis increased with the aggregation of the people into larger cities, although an exception to this rule was the fact that cities of 10,000-25,000 showed a slightly lower rate than cities of 5,000-10,000. Detroit and Grand Rapids showed very moderate rates, 127.2 and 125.3, respectively. The highest rate of any city in the State was that of Escanaba, 176.3, although Wyandotte, 173.5, was a good second, and Traverse City, 168.6, on account of its asylum mortality, as already explained, was not far below. * * * * * The lowest death rates * * * * * for cities over 5,000 are those of Alpena, 84.3, Port Huron, 85.7, West Bay City, 84.2, Cheyebogan, 75.6, and, by far the lowest of any city in the State of corresponding population, Lansing, with only 70.7 deaths per 100,000.

*Extracted from the Michigan Monthly Bulletin of Vital Statistics for July, 1905.

TABLE 15.—*The prevalence of tuberculosis in urban and rural localities, in Michigan, in 1905.*

Localities—grouped according to density of population.	Estimated population.	Health jurisdictions.			Cases.*	Deaths.	Death rates per 100,000 of the population.
		Total.	Infected.				
			Number.	Percent of all jurisdictions.			
Cities over 50,000.....	423,319	2	2	100	520	468	110.6
Cities from 25,000 to 50,000.....	144,748	4	4	100	168	163	112.6
Cities from 10,000 to 25,000, and Calumet town- ship (17,518).....	257,596	18	18	100	320	300	116.5
Cities and villages from 5,000 to 10,000†.....	147,649	23	23	100	185	174	117.8
Cities and villages under 5,000‡.....	375,013	304	202	55	420	390	104.0
Total urban.....	1,348,325	411	249	61	1,613	1,495	110.9
Balance of localities—principally townships§.....	1,208,950	1,229	506	48	977	909	80.2

*This footnote is below Table 12, on a preceding page.

†Exclusive of twenty-seven villages in the two groups, for which the populations in 1905 cannot be correctly estimated.

‡Includes the twenty-seven villages mentioned in the preceding paragraph, but does not include Calumet township, which, for the purpose of this study, is included in the third group of urban localities, which have corresponding populations.

THE SEASONAL FATALITY OF TUBERCULOSIS.

As a rule, tuberculosis in the early stages is not recognized, and consequently the time of its inception is not generally known or reported. This, coupled with the fact that regular reports of the progress of many cases are lacking, renders it difficult to determine, with any degree of accuracy, the seasonal prevalence of the disease. Table 16 is therefore designed to take the place of a table showing the seasonal prevalence. The months of greatest fatality, named in the order of greatest numbers of deaths, were April, May, March and December; the months of least fatality being from June to September, inclusive.

TABLE 16.—*The seasonal fatality from tuberculosis, in Michigan, as shown by the average numbers of deaths from this disease in each month in the twelve years, 1894-1905.*

Months.....	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Average numbers of deaths..	152	151	167	170	169	141	132	135	135	151	146	160

LOCATION OF THE DISEASE IN TUBERCULOSIS.

Table 17 shows that for a period of eleven years, ending in 1905, the disease was located in the lungs in nearly six times as many instances as in all the other organs of the body combined. Usually the disease was located in more than one part of the body, in many instances in several different organs or parts at the same time.

TABLE 17.—*Location of the disease in tuberculous patients, in Michigan, during the eleven years, 1895-1905.*

Part of the body.	No. of instances.	Part of the body.	No. of instances.	Part of the body.	No. of instances.
Abdomen.....	50	Iliac.....	2	Pharynx.....	6
Alimentary canal.....	4	Inguinal.....	1	Pleura.....	10
Ankle.....	5	Intestines.....	148	Rectum.....	11
Arm.....	2	Joints.....	6	Respiratory organs.....	4
Back.....	5	Kidneys.....	62	Ribs.....	2
Bladder.....	20	Knee.....	15	Shoulder.....	2
Blood.....	7	Larynx.....	163	Side.....	12
Bones.....	6	Leg.....	5	Skin.....	2
Bowels.....	649	Liver.....	62	Spine.....	35
Brain.....	31	Lungs.....	14,188	Spleen.....	6
Breast.....	2	Lymph system.....	11	Stomach.....	170
Bronchi.....	106	Mastoid.....	1	Suprarenal capsules.....	2
Chest.....	103	Maxilla.....	1	Testicle.....	2
Elbow.....	2	Membranes.....	1	Thigh.....	3
Face.....	2	Meninges.....	7	Thorax.....	27
Fibroid.....	33	Mesentery.....	33	Throat.....	32
Foot.....	5	Miliary.....	76	Tissues.....	2
General.....	340	Muscles.....	1	Tongue.....	2
Glands.....	46	Neck.....	3	Uterus.....	1
Hand.....	1	Omentum.....	1	Vertebrae.....	1
Head.....	12	Ovaries.....	2	Viscera.....	1
Heart.....	15	Pelvis.....	5	Windpipe.....	6
Hip joint.....	51	Peritoneum.....	113	Womb.....	3

REPORTED SOURCES OF CONTAGIUM.

Although but a small portion of the reports of cases which occurred in 1904 gave a source of contagium, Table 21 in the Annual Report of this Department for 1904 will serve to indicate the manner in which tuberculosis is generally spread. In 1905, the sources of contagium were not as fully reported as in 1904, but of the reports which stated a source, 158 cases were said to have been traced to a former case, and in 428 instances the patients were reported to have had tuberculous relatives or associates. It is probable that many of the cases reported in each year are due to association with others suffering from the disease. Members of a family in which there is a case of tuberculosis are necessarily and constantly exposed to the danger of infection unless the sputa of the patient are carefully and effectually destroyed and disposed of, and for this reason it should be the constant aim of physicians and health officials to educate the families of those suffering from the disease in the very simple methods of restriction of the disease.

In 1905, in reply to the question, "Can you trace any other case of consumption or tuberculosis to this case?" twenty-six health officers answered "Yes".

PREDISPOSING INFLUENCES AND PREMONITORY SYMPTOMS.

Table 18 may well be studied in connection with Table 7 in the article on the subject of pneumonia, on a preceding page, the tables indicating that the principal predisposing influences are practically the same in tuberculosis as in pneumonia. Both tables emphasize the necessity for the "ounce of prevention" in prompt and thorough treatment of a cold or cough, or in an attack of influenza or bronchitis, and in restrictive and preventive measures in typhoid fever, measles, and whooping-cough.

TABLE 18.—*Predisposing influences and premonitory symptoms in cases of tuberculosis in Michigan, in the nine years, 1897-1905.*

Disease began with or followed.	No. of instances.	Disease began with or followed.	No. of instances.	Disease began with or followed.	No. of instances.
Cough and cold.....	4,597	Fistula.....	5	Blood poisoning.....	1
Influenza.....	1,197	Heart trouble.....	5	Dropsy.....	1
Bronchitis.....	969	Scrophula.....	4	Ulceration of cornea....	1
Pneumonia.....	634	Change of life.....	4	Aphonia.....	1
Hemorrhage.....	622	Hay fever.....	4	Insomnia.....	1
General debility.....	305	Typhoid pneumonia...	4	Womb trouble.....	1
Pleurisy.....	87	Headache.....	4	Overexertion.....	1
Typhoid fever.....	67	Profuse expectoration..	4	Complication of diseases.	1
Catarrh.....	67	Pain in abdomen.....	4	Pain in shoulder.....	1
Bowel, stomach and in- testinal trouble.....	60	Dyspepsia.....	3	Pus-infected hand.....	1
Measles.....	53	Marasmus.....	3	Tape worm.....	1
Asthma.....	39	Tubercular glands.....	3	Pelvic cellulitis.....	1
Child birth.....	38	Swelling in neck.....	3	Hardening of lungs....	1
Fever.....	35	Swelling of limbs.....	3	Softening of brain.....	1
Diarrhea.....	34	Scarlet fever.....	3	Appendicitis.....	1
Abscess.....	32	Tonsillitis.....	3	Cholera infantum.....	1
Throat trouble.....	31	Paralysis.....	3	Ulceration of rectum....	1
Malarial fever.....	29	Night sweats.....	3	Brain fever.....	1
Whooping-cough.....	26	Gangrene of lungs.....	2	Enlargement of spleen..	1
Rheumatism.....	22	Pharyngitis.....	2	Result of operation....	1
Glandular affection....	20	Lupus on face.....	2	Cancer.....	1
Kidney and bladder trouble	13	Extreme nervousness...	2	Pain in breast.....	1
Pain in side.....	12	Lumbago.....	2	Diphtheria.....	1
Laryngitis.....	9	Curvature of spine....	2	Sore mouth.....	1
After miscarriage.....	8	Tumor.....	2	Result of vaccination...	1
Suppression of menses...	8	Diabetes.....	2	Peritonitis.....	1
Injury.....	8	Inhalation of dust.....	2	Pain in rectum.....	1
Anemia.....	7	Pott's disease.....	2	Coughed up a pin which had been swallowed	1
Liver trouble.....	6	Empyema.....	2	in childhood.....	1
		Cigarette smoking.....	2	Choking and filling up..	1

INFLUENCE OF AGE AND SEX IN TUBERCULOSIS.

Table 19 indicates that the greater numbers of those of both sexes who died or recovered from tuberculosis were between the ages of 20 and 30 years. From infancy up to the age of 20 years there was a gradual increase, and from 30 to 80 years a gradual decrease in the numbers of those who died or recovered. Of those who died or recovered between the ages of 1 and 40 years, the greatest number were females, and from 40 to 80 years, the greatest number were males. At all ages the females constituted about 55 per cent of those who died.

The average age of fatal cases in the twelve years, 1894-1905, was for males 25.8 years, and for females 31.9 years.

The average age of non-fatal cases in the twelve years, 1894-1905, was for males 32.5 years, and for females 30.2 years.

TABLE 19.—*The influence of age and sex in tuberculosis, as indicated by the numbers of those who died or recovered from this disease, in Michigan, in the twelve years, 1894-1905, arranged by sex, in age periods of ten years each.*

Age periods.	Died.						Recovered.		
	Numbers.			Per cent of all deaths of known ages.			Numbers.		
	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.
Under 10 years.....	327	376	703	1.60	1.84	3.44	3	2	5
10 to 20 years.....	784	1,680	2,464	3.85	8.24	12.09	9	11	20
20 to 30 years.....	2,636	3,723	6,359	12.93	18.26	31.19	15	20	35
30 to 40 years.....	1,908	2,379	4,287	9.36	11.67	21.03	12	22	34
40 to 50 years.....	1,421	1,279	2,700	6.97	6.27	13.24	8	6	14
50 to 60 years.....	1,007	779	1,786	4.94	3.82	8.76	5	2	7
60 to 70 years.....	691	622	1,313	3.39	3.05	6.44	3	1	4
70 to 80 years.....	378	300	678	1.85	1.47	3.32	.....	2	2
80 years and over.....	48	51	99	.24	.25	.49	.....	.....	.....
All ages.....	9,200	11,189	20,389	45.13	54.87	100.00	55	66	121

INFLUENCE OF COLOR IN TUBERCULOSIS.

Table 20 indicates that, according to the proportion of white and colored persons in the population, tuberculosis was most prevalent among the colored population.

Of the colored population, the disease was most prevalent among the Indians.

CIVIL CONDITION OF TUBERCULOUS PERSONS.

During the years 1895-1905, the reports of cases in which the civil condition of the patients was stated, showed that 59 per cent of the patients were or had been married, and that 41 per cent were single.

TABLE 20.—*The color of tuberculous persons, in Michigan, reported during the eleven years, 1895-1905.*

Color.	Number of instances in which the color was stated.	Per cent of all tuberculous persons of whom the color was stated.	Approximate proportion of the total population of the State.—Expressed in per cents.
White.....	19,195	96.76	99.08
Black (Negro).....	379	1.91	.64
Red (Indian).....	262	1.32	.26
Yellow (Japanese).....	1	0.01	.....

INFLUENCE OF OCCUPATION IN TUBERCULOSIS.

What has been said in the preceding article, relative to the influence of occupation in pneumonia, will apply equally to tuberculosis, as a comparison of Tables 10 and 21 will show.

TABLE 21.—*Occupations of tuberculous persons in the eleven years, 1895-1905.*

Occupations.	Number of instances.	Occupations.	Number of instances.	Occupations.	Number of instances.
Housework.....	5,834	Sailor.....	41	Boorman.....	5
Farmer.....	2,007	Gardener and florist.....	41	Hairdresser.....	4
Laborer.....	1,649	Tailor.....	36	Hunter.....	4
Student.....	783	Baker.....	36	Veterinary surgeon.....	3
Clerk (office or store).....	583	Physician and surgeon.....	34	Butter maker.....	3
Merchant.....	390	Shoemaker.....	33	Civil engineer.....	3
Mechanic.....	309	Musician.....	29	Athlete.....	3
Dressmaker and milliner.....	196	Nurse.....	27	Rag picker and sorter.....	3
Teacher.....	171	Moulder.....	27	Stereotyper.....	2
Machinist.....	152	Laundry work.....	25	Tanner.....	2
Miner.....	114	Waiter.....	22	Diver.....	2
Teamster.....	111	Soldier.....	21	Chiropodist.....	2
Factory employe.....	107	Minister.....	20	Undertaker.....	2
Salesman or agent.....	106	Fisherman.....	19	Patrolman.....	2
Painter and paper hanger.....	105	Lawyer.....	17	Bootblack.....	2
Saloon men.....	104	Photographer.....	17	Scientist.....	2
Railroad employe.....	79	Fireman.....	13	Balloonist.....	1
Barber.....	71	Stone or marble cutter.....	12	Attendant in asylum.....	1
Printer.....	69	Mail carrier.....	10	Dancing master.....	1
Cigar maker.....	63	Miller.....	10	Wood worker.....	1
Engineer.....	58	Janitor.....	8	Prostitute.....	1
Artist.....	52	Theatrical people.....	8	Father renovator.....	1
Woodman.....	47	Metal polisher.....	7	Chimney sweep.....	1
Cook.....	46	Dentist.....	6	Watchman.....	1

DURATION OF SICKNESS IN TUBERCULOSIS.

In using Table 22 it should be borne in mind that, in a large number of instances, the beginning of the disease was not definitely known, the duration periods given usually representing the time which elapsed between the recognition of the disease in an advanced stage and the death or recovery of the patient. This may be seen by the large numbers of cases of those who died or recovered at sometime within one year of the reported time of commencement of the sickness.

TABLE 22.—*The duration of sickness in fatal and non-fatal cases of tuberculosis, in Michigan, during the twelve years, 1894-1905.*

Duration periods.	Fatal cases.						Non-fatal cases.		
	Numbers.			Per cent of all cases of known duration.			Numbers.		
	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.
1 month.....	416	350	766	3.10	2.61	5.71	5	3	8
2 months.....	297	379	676	2.21	2.83	5.04	8	5	13
3 months.....	323	409	792	2.41	3.50	5.91	5	10	15
4 months.....	320	418	738	2.39	3.12	5.51	7	1	8
5 months.....	277	308	645	2.07	2.75	4.82	5	4	9
6 months.....	473	528	1,001	3.53	3.94	7.47	4	2	6
7 months.....	213	335	551	1.59	2.52	4.11	3	4	7
8 months.....	238	348	586	1.77	2.60	4.37	4	5	9
9 months.....	183	318	501	1.37	2.37	3.74	1	4	5
10 months.....	160	203	363	1.19	1.51	2.70	1	1	2
11 months.....	127	199	326	.95	1.48	2.43	3	1	4
Under 1 year.....	3,027	3,918	6,945	22.58	29.23	51.81	46	40	86
1 to 2 years.....	1,331	1,775	3,106	9.93	13.24	23.17	10	15	25
2 to 3 years.....	721	864	1,585	5.38	6.44	11.82	3	5	8
3 to 4 years.....	330	383	713	2.46	2.86	5.32	2	3	5
4 to 5 years.....	145	158	303	1.08	1.18	2.26	2	2	4
5 years and over.....	361	393	754	2.69	2.93	5.62	.....	4	4
Totals.....	5,915	7,491	13,406	44.12	55.88	100.00	63	69	132

RESTRICTIVE AND PREVENTIVE MEASURES.

That the education of the people in matters pertaining to the restriction of tuberculosis has not produced the results which, considering the wide publicity given the subject, might have been anticipated, is indicated by Table 23. The destruction of the sputa—upon which the restriction of tuberculosis principally depends—was properly carried out in but less than

one-third of all the cases which occurred in the years 1904-1905. It is not easy to place the blame for this condition, because it is believed that the members of the medical profession and the laity are both alive to the great importance of such restrictive measures, and well informed as to the simple methods of accomplishing the destruction of the infective material. In many cases the disease is not recognized, or the services of a physician called and restrictive measures begun until the patient is in the advanced stages of the disease.

In the pamphlet of instructions for the restriction and prevention of tuberculosis, issued by this Department, it is recommended that "All dejecta of a tuberculous person should be destroyed or disinfected; because it has been shown that the bacilli are to be found in the urine of persons having tubercular disease of the urinary organs, and in the feces of those having tubercular disease of the bowels, and they may be in the feces of those who swallow sputa containing the bacilli, that is, possibly, of any tuberculous person." And yet, in 1904 and 1905, in but 18 per cent of all cases reported in those years were the discharges from the bowels and bladder disinfected. The methods of disposing of the undisinfected dejecta of patients in certain cases in 1905, are shown below:

Buried, in 306 instances.

Vault, in 173 instances.

Closet or sewer, in 162 instances.

Cesspool, in 4 instances.

Ashes, in 2 instances.

The disinfection of the rooms which the patient has occupied is of great importance, and is usually carried out in as many instances as other restrictive measures, but the disinfection is too often limited to the bedroom of the patient. Where a tuberculous person has had the run of the entire house,—as they usually do prior to the last stages of the sickness—the disinfection of the entire house would be a wise precaution. It is quite probable that in nearly every case, the disinfection of the sitting room is quite as essential as the disinfection of the bedroom of the patient.

For the better restriction of tuberculosis three lines of work, of paramount importance, and previously outlined in many publications of this Board, are here reiterated:

1. A careful study of the early symptoms of the disease, so that incipient cases may be more easily and more frequently recognized than at the present time.

2. Careful tuition of the patient in the best measures for preventing the spread of the disease to others, and for securing himself or herself against reinfection.

3. Painstaking and conscientious effort on the part of the patient to prevent himself or herself from becoming a center of infection.

The burden of this work must, of necessity, devolve upon the medical practitioners, and it is to them we must look mainly for any material reduction in the sickness and deaths from this disease.

To the patients, the duty of taking care of and destroying the sputa, the turning away of the face and covering of the mouth and nostrils during a fit of coughing when in close proximity to others, the disinfection of the dejecta, and the thorough disinfection of all drinking vessels and other articles which may come in contact with the mouth, and which may be used by others as well as themselves, may seem irksome, and to some unnecessary and unimportant. Nevertheless, until this daily and hourly task shall

become an integral part of every patient's daily life, we cannot hope for a successful termination of the warfare now being waged against this disease.

A person who, while suffering from tuberculosis, carelessly or willfully expectorates promiscuously and refuses to take precautionary measures, should be placed in detention until willing to comply with the simple and reasonable requirements laid down for his or her guidance.

TABLE 23.—*Showing the number and per cent of cases of tuberculosis in which the sputa, all articles liable to be soiled by sputa, the discharges from the bowels and bladder, and the rooms occupied by tuberculous persons, were reported as having been properly disinfected, during the years 1904 and 1905.*

Disinfection of the	Number of instances in which the disinfection was reported as thorough.	The per cent of all cases of tuberculosis in which the disinfection was said to be thorough.
Sputa.....	2,222	40*
Articles liable to be soiled by sputa.....	2,315	42*
Discharges from the bowels and bladder.....	974	18
Rooms occupied by patients.....	2,018	37

*There were 24 instances in which it was reported "No sputa," therefore this number has been deducted from the total number of cases before making the per cents.

BACTERIOLOGICAL DIAGNOSIS IN TUBERCULOSIS.

During the eleven years, 1895-1905, reports relative to the bacteriological examination of 1,999 samples of sputa of suspected cases of tuberculosis indicate that 94 per cent gave positive and 6 per cent negative results.

A more general examination of the sputa of persons who exhibit any of the premonitory symptoms of tuberculosis would, it is believed, be of great service in the early diagnosis of the disease, and thus enable the patients to begin treatment at a time when remedial measures would be of great value in arresting the further progress of the disease. The early recognition of the disease followed by the prompt institution of restrictive and preventive measures are the foundation principles of all efforts which have for their object the saving of the lives of the patients themselves and the prevention of the spread of the disease to others.

NEGLECT OF PHYSICIANS IN REPORTING CASES OF TUBERCULOSIS.

The following is extracted from a letter received in 1905 from the health officer of a large city, and represents the situation in many other localities in this State:

"You will notice by our reports that we have quite a few deaths from tuberculosis but there is almost none on our books so that we don't know anything about them until after death, we requested several times the local medical profession to report to us such cases but it is of no avail."

If physicians would always notify their tuberculous patients of the nature of their sickness as soon as the disease is recognized, and instruct them in

the proper methods of preventing the spread of the disease, the neglect to make reports of these cases to the local health officials would not be a serious hindrance to the work of the latter in restricting and preventing the disease. But if physicians fail to notify their patients of the nature of their malady, the latter will unconsciously leave a trail of infection wherever they may go, and nullify the measures put forth by the health officials for the restriction of this disease.

Tuberculosis is universally recognized as a very dangerous communicable disease, and the laws of this State very properly require physicians and householders to make reports of such diseases to the local health officials, to the end that they may be restricted and prevented, and there can be no logical reason why any physician should hesitate to cooperate with health officials for the suppression of one of the most dangerous of all the diseases to which the flesh is heir.

A world wide movement is on foot for the restriction and prevention of tuberculosis; sanatoria for the treatment of patients are being erected and maintained at enormous expense; organizations for the education of the people relative to the nature of the disease and the proper measures for its restriction and prevention have sprung up in many of the large cities; wealthy people have contributed large sums of money for the institution and prosecution of measures for the suppression of this disease; and the subject is receiving more attention at the hands of writers upon public health matters than probably any other subject of this nature. But a lack of cooperation on the part of physicians and their tuberculous patients will tend to hinder the work of the local health officials and others actively engaged in the work of restricting and preventing the disease, and to indefinitely postpone the end for which so much labor and money are being expended.

THE STATE SANATORIUM.

The law establishing a State Sanatorium for the care and treatment of persons suffering from tuberculosis in this State was printed on page 25 of the annual report of this Department for 1905.

The board of trustees appointed by the Governor for the control of the property and affairs of the institution are as follows:

Henry J. Hartz, M. D., Detroit.

Frank B. Leland, Detroit.

Hon. G. W. Teeple, Pinckney.

Collins H. Johnston, M. D., Grand Rapids.

R. S. Copeland, M. D., Ann Arbor.

Frank R. Gray, M. D., Clare.

A site, consisting of 192 acres, and located in Marion township, Livingston county, about two and one-half miles from the village of Howell, was secured and plans for an administration building and one shack were prepared. The buildings are in course of construction, and will probably be completed, as far as the present appropriation will allow, by the latter part of 1906.

Further particulars relative to this institution will be given in subsequent reports of this Department.

MENINGITIS IN MICHIGAN IN 1905 AND PRECEDING YEARS.

GENERAL PREVALENCE.

During the year 1905, meningitis was reported to the Secretary of the State Board of Health from 306 localities, in which there were reported to have occurred 675 cases, including 646 deaths from this disease.

Of the 675 cases which began in 1905, 630 died and 20 recovered in the same year; 11 died and 9 recovered in the following year, and 5 cases were not reported as having died or recovered.

Of the 646 deaths which occurred in 1905, 16 were taken sick in 1904, and these were not taken into consideration as *cases* in 1905, they having been included in the total number of cases in the article upon this subject in the preceding annual report.

From the numbers of cases and deaths shown in Table 24, it will be seen that, as a rule, only the fatal cases were reported.

In previous years the disease has been considered under the various names reported, viz.: Cerebro-spinal meningitis, cerebral meningitis, meningitis, spinal meningitis, tubercular meningitis and traumatic meningitis. In this article, all the various forms of the disease have been considered under the general title of meningitis.

For the purpose of learning what relation the numbers of cases and deaths from tubercular and traumatic meningitis bear to the total meningitis, these two forms of the disease have been considered separately in Table 26.

In the tables, wherever possible, totals, averages and per cents for a series of years, rather than for the single year 1905, have been shown.

By Table 24 it will be seen that in 1899, when the statistical study of meningitis was first commenced by this Department, the disease was unusually prevalent, therefore the average of series of years beginning with 1899 are higher than they would be for similar periods under normal conditions.

Meningitis was unusually prevalent in some of the Eastern States in the early part of 1905, and it was feared the disease would become epidemic in other parts of the country. While the number of cases which were reported to this Department as having occurred in Michigan in the months of January and February were considerably greater than the averages for corresponding months in the seven preceding years, the numbers of cases reported in March and April—the months of greatest prevalence in New York—did not differ materially from the averages for those months, and at no time did the disease assume an epidemic form in this State.

By reason of the severity of the epidemic of meningitis in the Eastern States in 1905, and the somewhat limited knowledge concerning this disease, much attention was given to the study of the disease at that time. The following extracts from a contribution to the study of meningitis appeared in the "Michigan Monthly Bulletin of Vital Statistics" in March, 1905, and is reprinted in this report for the benefit of those who may not have received a copy of that issue of the bulletin.

EPIDEMIC CEREBROSPINAL MENINGITIS.*

This disease, sometimes known as "cerebrospinal fever" or formerly, the term being almost obsolete, as "spotted fever," has been unusually prevalent and fatal during the early months of 1905 in New York and the East, and press reports of its epidemic prevalence and possible spread Westward have aroused widespread interest in the subject throughout the country. According to a statement in the Journal of the American Medical Association of April 1, "cerebrospinal meningitis has claimed 386 lives in Greater New York since January 1. Most of the victims were children." Following are the actual figures showing mortality from "simple meningitis," or rather all forms of meningitis except tuberculous meningitis and traumatic meningitis, and from cerebrospinal meningitis according to the Weekly Reports issued by the Health Department of the city of New York for the five weeks ending April 1, 1905:

Week ending—	Simple meningitis.†	Cerebrospinal meningitis.
March 4, 1905.....	80	60
March 11, 1905.....	99	76
March 18, 1905.....	97	72
March 25, 1905.....	98	85
April 1, 1905.....	139	131
Total, five weeks.....	513	424
Corresponding five weeks of 1904.....	174	83

The weekly mortality table for the cities of the United States published by the U. S. Public Health and Marine-Hospital Service for March 31 gives only a few deaths from this cause (Jersey City, 12 deaths for two weeks ending March 19; Lowell, 4 deaths for week ending March 25,) but the fact that New York is given in this table as having no deaths from cerebrospinal meningitis for the week ending March 25, although we have just seen that the official city report states that there were 85 deaths from this cause in that week, would seem to cast some doubt upon the full reliability of the data presented.

For many reasons an absolutely trustworthy statistical statement of the mortality from epidemic cerebrospinal meningitis is difficult to obtain. Cases of meningitis, that is to say, inflammation of the meninges or serous coverings of the brain and spinal cord, are of constant occurrence. When these isolated or sporadic cases become sufficiently numerous, then the tendency is to regard the disease as epidemic, and cases subsequently occurring are characterized as the true cerebrospinal fever or epidemic cerebrospinal meningitis, rather than as the simple form of the disease. The matter is further complicated because meningitis may be a complication or sequel of many acute diseases, and is supposed to be particularly associated with pneumonia, from whose bacillus, the pneumococcus, many cases of meningitis that are indistinguishable from the specific cerebrospinal fever originate. In order to show the forms that are liable to be confused among the returns of meningitis received by a statistical office, we may refer to the etiological table given in the last edition of a standard work, by Dr. William Osler, formerly of Johns Hopkins and now holding an honored position at Oxford. Dr. Osler's arrangement is as follows:

Acute Leptomeningitis.	Primary.....	1. Of cerebro-spinal fever..	{ (a) Sporadic..... (b) Epidemic..... }	Diplococcus intracellularis.
		2. Pneumococcic.....	{ Meninges alone involved or in a general pneumococcus infection }	Pneumococcus.
	Secondary.....	1. Tuberculous.....		Bacillus tuberculosis.
		2. Pneumococcic.....	{ (a) Secondary to pneumonia, endo- carditis, etc..... (b) Secondary to disease or in- jury of cranium or its fossae..... }	Pneumococcus.
		3. Pyogenic.....	{ (a) Following local disease of cranium or a local infection elsewhere..... (b) Terminal infection in various chronic maladies..... }	Various forms of staphylococci and streptococci.
		4. Miscellaneous acute in- fections.....	{ In typhoid fever, influenza, diph- theria, gonorrhoea, anthrax, ac- tinomyces, and other acute diseases..... }	Typhoid bacillus, influenza ba- cillus, diphtheria bacillus, gonococcus, etc.

*From the Michigan Monthly Bulletin of Vital Statistics, March, 1905.

†This column, representing deaths from all forms of meningitis except those returned as tuberculous and traumatic, includes the deaths compiled in the following column.

Most statistical classifications of causes of death agree in the attempt to distinguish between ordinary simple acute meningitis and the specific disease known as epidemic cerebrospinal meningitis or cerebrospinal fever, the causal agent of which is now generally understood to be the diplococcus intracellularis meningitidis and not the pneumococcus, bacillus of tuberculosis or germ of any other of the infectious diseases sometimes complicated with meningitis. Thus in the "New List of Causes of Death as used in the Annual Reports of the Registrar-General for England and Wales," issued in December, 1902, we find that "Cerebro Spinal Fever" appears among the "General Diseases," "Tuberculous Meningitis" has a separate place, and among "Local Diseases," under the "Diseases of the Nervous System," we find "Meningitis, Inflammation of Brain" forming a title. In order to see the actual distribution in practice, the Registrar-General's Report for 1902 may be examined, where out of upwards of 500,000 deaths from all causes per annum for each of the years, 1883-1902, from 9 (in 1900) to 60 (in 1902) were compiled from "Cerebro-spinal Fever." This disease, so far as the statistical compilation would indicate, is quite insignificant in England, and of much less importance than the other forms of meningitis. Tuberculous meningitis caused 5,961 deaths in 1902 (the minimum year), while "Meningitis, Inflammation of Brain," caused 6,572 deaths in the same year, likewise a minimum for this disease. The old "brain fever," long regarded as an opprobrium in statistical reports, is doubtless included under "inflammation of brain," thus helping to obscure the total of meningitis. It is uncertain how much value can be ascribed to the figures for cerebrospinal fever when we consider the much greater bulk of indefinite forms of meningitis returned, a little variation in which would quite overwhelm any conclusions based on the figures given for the epidemic disease.

Again in the revised classification of Virchow just issued by the Imperial Board of Health of Germany, we find provision made for tuberculous meningitis (including acute hydrocephalus) under tuberculosis, a separate title for epidemic cerebrospinal meningitis among the "Infectious and Parasitic Diseases," and under "Diseases of the Nervous System," among "Local Diseases," separate titles for cerebral and spinal meningitis. Syphilitic meningitis is referred to syphilis as the primary cause. The International classification, used by many foreign countries and adopted as the official system by the United States, makes similar divisions except that no distinction is made between cerebral and spinal meningitis and ordinarily no attempt is made to separately state the occurrence of the epidemic form of meningitis. While theoretically, on the basis of the etiological classification of the forms of disease, such a distinction would be very desirable, practically, in dealing with actual returns from physicians, it may be quite impossible to find any satisfactory distinctions on which the desired separations can be made. For this reason, the U. S. Census "Manual of the International Classification," which is followed as authority in this department in compiling the returns of deaths for the Bulletin and for the Annual Registration Reports, does not give more than the single title "Meningitis," and any increase in the epidemic prevalence of cerebrospinal fever can probably be followed as readily in this combined group as if the epidemic form was specified. It is likely, moreover, as hinted at in the New York returns, that with the acknowledged prevalence of epidemic meningitis many cases would be so reported by physicians that would ordinarily be included among simple meningitis, so that in this way there is less likelihood of error in using the combined expression.

TABLE 24.—*The prevalence of meningitis, in Michigan, in each of the seven years, 1899-1905.*

Years.	Population.	Number of cases.*	Number of deaths.	Deaths per 100,000 population.
1899.....	2,426,331†	1,306	1,079	44.5
1900.....	2,420,982	747	688	28.4
1901.....	2,448,241†	614	594	24.3
1902.....	2,475,499†	632	598	24.2
1903.....	2,502,758†	645	630	25.2
1904.....	2,530,016	598	586	23.2
1905.....	2,557,275†	675	646	25.3
Annual averages.....	2,480,157	745	689	27.8

*For many localities, only the fatal cases were reported, so that the figures in this column do not accurately represent the numbers of cases which occurred.

†Estimated.

TABLE 25.—*The number of reported deaths from meningitis,* in Michigan, per 100,000 persons living, in each of the thirty years, 1869-1898. Compiled from the Secretary of State's Vital Statistics of Michigan.*

Years.....	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.
Deaths.....	1.2,	.9	2.0	28.6	62.6	13.9	12.0	8.6	9.3	7.2	6.6	9.7
Years.....	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.
Deaths.....	19.6	13.0	12.7	12.8	9.2	9.4	9.3	9.6	8.0	8.6	9.6	6.8
Years.....	1893.	1894.	1895.	1896.	1897.	1898†						
Deaths.....	7.8	8.1	7.8	8.3	9.7	28.4.						

*Does not include tubercular meningitis.

†Not all the deaths were reported under the old law, therefore a comparison of death rates for any year subsequent to 1897 with the death rates for any period prior to 1898 would not be reliable. The rates for the twenty-nine years, ending with 1897, probably quite accurately represent the annual fluctuations of the disease.

TABLE 26.—*The reported numbers of cases and deaths from tubercular and traumatic meningitis, in Michigan, in the seven years, 1899-1905.*

Years.	Tubercular.				Traumatic.			
	Number of cases.	Number of deaths.	Per cent of all forms of meningitis.		Number of cases.	Number of deaths.	Per cent of all forms of meningitis.	
			Cases.	Deaths.			Cases.	Deaths.
1899.....	42	41	3	4	22	22	2	2
1900.....	93	83	12	12	17	17	2	2
1901.....	86	86	14	14	22	22	4	4
1902.....	96	94	15	16	8	8	1	1
1903.....	106	106	16	17	14	14	2	2
1904.....	126	*133	21	23	24	24	4	4
1905.....	95	107	14	16	3	4	.4	.6

*Many cases began in preceding years.

GEOGRAPHICAL DISTRIBUTION OF MENINGITIS.

Table 27 indicates that during the seven years, ending with 1905, meningitis was more prevalent than the average for the State as a whole (shown in Table 24) in the Upper Peninsula, Northwestern, Northern, Southeastern, Western, and Northern Central Divisions.

By the same standard, the disease was much more prevalent than the average in the counties of Houghton, Keweenaw, Antrim, Wexford, Baraga, Marquette, Benzie, Menominee, Wayne, Cheboygan, Emmet, Kent and Mecosta.

THE PREVALENCE OF MENINGITIS IN URBAN AND RURAL LOCALITIES.

Table 28 shows meningitis to have been present, in 1905, in 29 per cent of the incorporated cities and villages, having a population of 5,000 and upwards, and in 15 per cent of the rural localities in this State.

As in the case of pneumonia and tuberculosis, previously considered, as a rule, meningitis was most prevalent in the large centers of population.

As indicated by the death rates, the cities and villages in which meningitis was much more prevalent than the average for the State (25.3 deaths per 100,000) were: Delray (98.0), Negaunee (88.7), Calumet township (79.9), Ishpeming (62.4), Sault Ste. Marie (60.0), St. Joseph (55.9), Ironwood (49.5), Iron Mountain (47.5), Menominee (46.9), Hancock (45.9), Flint (45.7), Cheboygan (44.2), Escanaba (43.5), Detroit (39.9), Albion (39.6), Jackson (39.5), Wyandotte (36.4), Kalamazoo (35.3), Port Huron (34.6), Ann Arbor (34.2), Grand Rapids (32.7), and Monroe (31.3).

TABLE 27.—*The geographical distribution of meningitis, in Michigan, in the seven years, 1899-1905, as indicated by the average numbers of cases and deaths, and the average deaths per 100,000 persons living, in each geographical division shown in the table.*

Geographical division.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
UPPER PENINSULA DIVISION.				
Alger county.....	266,139	123.9	111.7	42.0
Baraga county.....	6,157	2	2	32.5
Chippewa county.....	4,941	2	2	40.5
Delta county.....	21,490	5	5	23.3
Dickinson county.....	25,612	8	7	27.3
Gogebic county.....	18,128	6	6	33.1
Houghton county.....	16,822	5	5	29.7
Iron county.....	66,949	58	50	74.7
Keweenaw county.....	8,949	1	.8	8.9
Luce county.....	3,830	2	2	52.2
Mackinac county.....	3,355	.9	.9	26.8
Marquette county.....	7,822	2	2	25.6
Menominee county.....	40,464	17	16	39.5
Ontonagon county.....	26,478	10	10	37.8
Schoolcraft county.....	6,732	3	1	14.9
	8,410	2	2	23.8
NORTHWESTERN DIVISION.				
Benzie county.....	89,408	40	30	33.6
Grand Traverse county.....	10,550	6	4	37.9
Leelanau county.....	22,257	6	5	22.5
Manistee county.....	10,813	3	3	27.7
Wexford county.....	27,578	13	9	32.6
	18,210	12	9	49.4
NORTHERN DIVISION.				
Antrim county.....	81,241	31.4	27.3	33.6
Charlevoix county.....	15,847	9	8	50.5
Cheboygan county.....	15,026	3	3	20.0
Crawford county.....	16,559	8	6	36.2
Emmet county.....	3,344	.4	.3	9.0
Kalkaska county.....	16,564	7	6	36.2
Otsego county.....	7,260	2	2	27.5
	6,641	2	2	30.1
NORTHEASTERN DIVISION.				
Alcona county.....	58,282	9.5	9.3	16.0
Alpena county.....	5,650	.7	.7	12.4
Iosco county.....	19,359	3	3	15.5
Montmorency county.....	10,188	2	2	19.6
Ogemaw county.....	3,441	.9	.9	26.2
Oscoda county.....	8,197	.9	.7	8.5
Presque Isle county.....	1,724			
	9,723	2	2	20.6
WESTERN DIVISION.				
Kent county.....	273,820	87	78.9	28.8
Lake county.....	135,419	56	49	36.1
Mason county.....	5,005	1	.9	18.0
Muskegon county.....	19,570	3	4	20.4
Newaygo county.....	36,778	9	8	21.8
Oceana county.....	18,040	4	4	22.2
Ottawa county.....	17,373	3	3	17.3
	41,605	11	10	24.0
NORTHERN CENTRAL DIVISION.				
Chare county.....	105,477	32.6	30.3	28.7
Gladwin county.....	8,824	3	3	34.0
Isabella county.....	7,541	1	1	13.3
Macatawa county.....	23,774	8	7	29.4
Midland county.....	20,607	8	7	31.0
Muskegon county.....	14,828	4	4	27.0
Muskegon county.....	9,826	3	3	30.5
Oscoda county.....	18,406	5	5	27.2
Roscommon county.....	1,671	.6	.3	18.0

*This footnote is below Table 24, on a preceding page.

†Average for six years only.

TABLE 27.—CONCLUDED.

Geographical division.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
BAY AND EASTERN DIVISION.	345,770	79	77	22.3
Arenac county.....	9,829	1	1	10.2
Bay county.....	63,672	17	16	25.1
Huron county.....	34,972	7	7	20.0
Lapeer county.....	27,442	4	4	14.6
Saginaw county.....	83,619	18	18	21.5
Sanilac county.....	35,038	7	7	20.0
St. Clair county.....	55,141	15	14	25.4
Tuscola county.....	36,057	10	10	27.7
CENTRAL DIVISION.	315,250	75	72	22.8
Barry county.....	22,406	7	6	26.8
Clinton county.....	25,291	6	5	19.8
Eaton county.....	31,382	7	7	22.3
Genesee county.....	42,334	9	9	21.3
Grafton county.....	30,096	9	9	29.9
Ingham county.....	42,191	10	10	23.7
Ionia county.....	34,920	9	7	20.0
Livingston county.....	19,155	3	3	15.7
Montcalm county.....	33,497	9	10	29.9
Shiawassee county.....	33,978	6	6	17.7
SOUTHWESTERN DIVISION.	142,999	31	28	19.6
Allegan county.....	38,979	11	9	23.1
Berrien county.....	49,558	9	9	18.2
Cass county.....	20,506	4	4	19.5
Van Buren county.....	33,956	7	6	17.7
SOUTHERN CENTRAL DIVISION.	322,668	69	68	21.1
Branch county.....	26,720	6	6	22.5
Calhoun county.....	51,715	9	10	19.3
Hillsdale county.....	29,839	5	5	16.8
Jackson county.....	47,660	12	12	25.2
Kalamazoo county.....	47,406	13	12	25.3
Lenawee county.....	48,812	8	8	16.4
St. Joseph county.....	23,658	6	5	21.1
Washtenaw county.....	46,858	10	10	21.3
SOUTHEASTERN DIVISION.	478,889	161	160	33.4
Macomb county.....	33,144	8	8	24.1
Monroe county.....	33,055	9	10	30.3
Oakland county.....	45,257	6	6	13.3
Wayne county.....	367,433	138	130	37.0

*This footnote is below Table 24, on a preceding page.

†Average for six years only.

TABLE 28.—*The prevalence of meningitis in urban and rural localities in Michigan, in 1905.*

Localities—grouped according to density of population.	Estimated population.	Health jurisdictions.			Cases.*	Deaths.	Death rates per 100,000 of the population.
		Total.	Infected.				
			Number.	Per cent of all jurisdictions.			
Cities over 50,000.....	423,319	2	2	100	167	162	38.3
Cities from 25,000 to 50,000.....	144,748	4	4	100	33	33	22.8
Cities from 10,000 to 25,000, and Calumet township (17,518).....	257,596	18	17	94	77	78	30.3
Cities and villages from 5,000 to 10,000†.....	147,649	23	18	78	43	42	28.4
Cities and villages under 5,000†.....	375,013	364	79	22	111	103	27.5
Total urban.....	1,348,325	411	120	29	431	418	31.0
Balance of localities—principally townships‡.....	1,208,950	1,229	186	15	244	228	18.9

*This footnote is below Table 24, on a preceding page.

†Exclusive of twenty-seven villages in the two groups, for which the population in 1905 cannot be correctly estimated.

‡Includes the twenty-seven villages mentioned in the preceding paragraph, but does not include Calumet township, which, for the purpose of this study, is included in the third group of Urban localities, which have corresponding populations.

THE SEASONAL PREVALENCE OF MENINGITIS.

Table 29 is compiled from two different sources, and shows that meningitis is most prevalent in the months of March, April and May, and least prevalent in the months of October, November and December. This coincides with the results of observations made in epidemics of meningitis in this and other countries, notably, the outbreak in New York in 1892 and 1893, which was most violent in May; the epidemic in Cologne in 1895, which reached its maximum in April; and the epidemic in Strasburg in 1841, in which the greatest numbers of cases occurred in March.

TABLE 29.—*The seasonal prevalence of meningitis, in Michigan, in so far as indicated by the average numbers of persons taken sick and who died from this disease in each month, in the seven years, 1899-1905.*

Months.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Average numbers of those taken sick	40	43	72	68	55	38	40	39	39	33	29	30
Average numbers of deaths.....	44	48	65	60	62	43	46	41	38	33	28	33

TABLE 30.—*Reported sources of contagium and predisposing influences in meningitis in Michigan, in the seven years, 1899-1905.*

Source of contagium, or predisposing influence.	Number of instances	Source of contagium, or predisposing influence.	Number of instances	Source of contagium, or predisposing influence.	Number of instances
Cold.....	124	Heart disease.....	4	Abortion.....	1
Result of injury.....	121	Epilepsy.....	4	Female trouble.....	1
Influenza.....	89	Glandular affection.....	4	Diphtheria.....	1
Bowel, stomach and intestinal trouble.....	82	Spasms.....	4	Remittent fever.....	1
Traced to a former case.....	78	Idiocy and insanity.....	4	Continued fever.....	1
Idiopathic.....	78	From operation.....	4	Headache.....	1
Pneumonia.....	71	Hydrocephalus.....	4	Old age.....	1
Exposure to weather.....	40	Paralysis.....	4	Carbuncle.....	1
Middle ear disease.....	40	Convulsions.....	3	Nasal trouble.....	1
Tuberculosis.....	36	Diseases of eye.....	3	Chronic St. Vitus dance and acute eclampsia.....	1
Measles.....	34	Exposure to sun.....	3	Deformity.....	1
Whooping-cough.....	26	Tumor.....	3	Well water.....	1
Related to or associated with consumptives.....	24	Erysipelas.....	3	Burn or scald.....	1
Cholera infantum.....	22	Endocarditis.....	2	Received whipping at school—severe nervous shock.....	1
Bronchitis.....	20	Ruptured blood vessel.....	2	Goitre.....	1
Insanitary surroundings.....	19	Ilio colitis.....	2	Feet presentation.....	1
Teething.....	19	Myelitis.....	2	Neuratic.....	1
Overwork.....	17	Pleurisy.....	2	Sporadic.....	1
Typhoid fever.....	14	Cigarette smoking.....	2	Smallpox.....	1
Spina bifida.....	11	Bright's disease.....	2	Mumps.....	1
Syphilis.....	10	Overheat.....	2	Veneral infection.....	1
Alcoholism.....	10	Outside jurisdiction.....	2	Hemorrhage.....	1
Hereditary.....	10	Cancer.....	2	Extraction of teeth.....	1
General debility.....	9	Ulcerated tooth.....	2	Miscarriage.....	1
Dysentery.....	9	Osgenito.....	2	Non-development of skull.....	1
Scarlet fever.....	9	Despondency.....	2	Tonsillitis.....	1
Abscess.....	8	Mental strain.....	1	Serofula.....	1
Malaria.....	7	Meningitis from birth.....	1	Appendicitis.....	1
Rheumatism.....	7	Drinking large quantities of ice water.....	1	Locomotor ataxia.....	1
Brain disease.....	7	Marasmus.....	1	Infected article.....	1
Septic poisoning.....	6	Lack of bone foundation at base of brain.....	1	Pernicious anemia and cold.....	1
Spinal affection.....	6	Worms.....	1	Exposure to dampness and cold and pregnancy.....	1
Rachitis.....	6	Peromelia.....	1		
Child birth.....	5				

REPORTED SOURCES OF CONTAGIUM AND PREDISPOSING INFLUENCES IN MENINGITIS.

The number of instances in which the sources of contagium or the predisposing influences in meningitis were reported to this Department during the seven years, ending in 1905, was slightly less than one-fifth of the total number of cases which occurred during that period. It is believed, however, that the summary of these reports, shown in Table 30, is fairly representative of the diseases and influences usually associated with and which play an important part in outbreaks of meningitis.

Table 31 may well be studied in connection with Table 30, and when continued for a number of years Table 31 will probably be of much value in determining the connection between outbreaks of meningitis and of the other three diseases named in the table.

TABLE 31.—*Meningitis, in Michigan, in 1904 and 1905, and previous and contemporaneous cases of meningitis, tuberculosis, influenza and pneumonia, which occurred in the same families in which the meningitis patients resided.*

Diseases.	The time which elapsed between cases of meningitis in 1904 and 1905 and previous and contemporaneous cases of the diseases named below, with the numbers of instances in each period of time.									
	On or about the same time.	1 day.	3 days.	14 days.	1 month.	2 months.	4 months.	5 months.	6 months.	1 year and over.
Meningitis	14	1	.....	2	.....	.....	1	.....	1	1
Tuberculosis.....	11	.....	.....	.....	.....	.....	1	.....	1	2
Influenza.....	3	.....	1	.....	1	.....	.....	.....	.....	.....
Pneumonia.....	1	.....	.....	.....	.....	1	.....	1	1	.....

THE INFLUENCE OF AGE AND SEX IN MENINGITIS.

Table 32 confirms what has been stated in preceding reports relative to meningitis, that it is essentially a disease of childhood, nearly 57 per cent of all the fatal cases, in which the age was stated, during the seven years ending in 1905, having occurred in children under five years of age. There was a gradual decrease in the number of deaths corresponding with each increase in the ages.

With but one exception (ages 10 to 14 years), meningitis was most fatal amongst the male population at all ages shown in the table.

THE DURATION OF SICKNESS IN MENINGITIS.

Table 33 shows that of 2,245 fatal cases of meningitis in the five years, 1901-1905, 37 per cent of the deaths occurred between the first and fifth days; about 62 per cent between the first and tenth days, and 77 per cent between the first and fifteenth days.

TABLE 32.—*The influence of age and sex in meningitis, in Michigan, as indicated by the numbers of those who died from this disease in the seven years, 1899-1905. Arranged, by sex, in age periods of five years each.*

Age periods.	Numbers of deaths in which the age was stated.			Per cent of all deaths from meningitis, of known ages.			Average deaths for year.		
	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.
Under 5 years.....	1,540	1,141	2,681	32.44	24.04	56.48	220	163	383
5 to 9 years.....	278	252	530	5.85	5.31	11.16	40	36	76
10 to 14 years.....	141	156	297	2.97	3.29	6.26	20	22	42
15 to 19 years.....	160	136	296	3.37	2.86	6.24	23	19	42
20 to 24 years.....	96	90	186	2.02	1.90	3.92	14	13	27
25 to 29 years.....	81	67	148	1.71	1.41	3.12	12	10	21
30 to 34 years.....	56	48	104	1.18	1.01	2.19	8	7	15
35 to 39 years.....	63	40	103	1.33	.84	2.17	9	6	15
40 to 44 years.....	50	42	92	1.05	.88	1.94	7	6	13
45 to 49 years.....	37	32	69	.78	.67	1.45	5	5	10
50 years and over.....	147	94	241	3.10	1.98	5.08	21	13	34
All ages.....	2,649	2,098	4,747	55.80	44.20	100.00	378	300	678

TABLE 33.—*The duration of sickness in fatal cases of meningitis, in Michigan, in the five years, 1901-1905. Arranged by sex, in five day periods.*

Duration periods.	Numbers of deaths in which the duration was stated.			Averages per year.			Per cent of all fatal cases of meningitis of known duration.		
	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.
1 to 5 days.....	485	338	823	97	68	165	21.60	15.06	36.66
6 to 10 days.....	287	279	566	57	56	113	12.78	12.43	25.21
11 to 15 days.....	174	170	344	35	34	69	7.75	7.57	15.32
16 to 20 days.....	78	79	157	16	16	31	3.47	3.52	6.99
21 to 25 days.....	67	53	120	13	11	24	2.99	2.36	5.35
26 to 30 days.....	31	24	55	6	5	11	1.38	1.07	2.45
31 to 35 days.....	12	15	27	2	3	5	.53	.67	1.20
36 to 40 days.....	8	10	18	2	2	4	.36	.44	.80
41 to 45 days.....	10	7	17	2	1	3	.45	.31	.76
46 to 50 days.....	4	8	12	.8	2	2	.18	.36	.54
51 days and over.....	59	47	106	12	9	21	2.63	2.09	4.72
Totals and averages.....	1,215	1,030	2,245	242.8	207	448	54.12	45.88	100.00

RESTRICTIVE MEASURES IN MENINGITIS.

Information from health officers relative to restrictive measures in meningitis in 1904-1905 was very meagre, as may be seen by reference to Table 34. So far as indicated by those reports in which definite statements relative to isolation and disinfection were made, in but a small proportion of the cases were the usual precautions taken to prevent the spread of the disease. It may be seen that only 17 per cent of all the cases which occurred were isolated, and but 39 per cent of the infected premises were disinfected.

TABLE 34.—*Restrictive and preventive measures in meningitis, in Michigan, in 1904 and 1905.*

Restrictive measures.	Number of instances.	Per cent of all cases.
ISOLATION: Enforced.....	214	17
Neglected.....	436	34
SPUTA: Disinfected.....	283	23*
Not disinfected.....	261	21
ARTICLES LIABLE TO BE SOILED BY SPUTA:		
Disinfected.....	372	30 *
Not disinfected.....	237	11
BOWEL DISCHARGES: Disinfected.....	190	15 †
Buried.....	91	7
Thrown in privy.....	74	6
Thrown in sewer.....	75	6
"Thrown out".....	9	.7
"Usual disposition".....	5	.4
INFECTED ROOMS: Disinfected.....	499	39
Not disinfected.....	311	24

*Fifty cases, in which there was said to be no sputa, excluded in making these per cents.

†Four cases, in which there was said to be no discharges, excluded in making this per cent.

TYPHOID FEVER IN MICHIGAN IN 1905 AND PRECEDING YEARS.

GENERAL PREVALENCE.

By Table 35, it may be seen that, in 1905, typhoid fever was less prevalent than in 1904, but more prevalent than in the average year.

Table 36 is republished for the benefit of those who desire to make comparison of the death rates from typhoid fever prior to 1884 with those of any period since that time.

A comparison of the death rates from typhoid fever in Michigan with the death rates from this disease in other states, cities outside of Michigan, and foreign countries, is very well presented in the following extract from the Michigan Monthly Bulletin of Vital Statistics, for August, 1905:

MORTALITY FROM TYPHOID FEVER IN MICHIGAN FOR FIVE YEARS, 1900-04.*

* * * * *

The total number of deaths reported and compiled from typhoid fever during the past five years has amounted to 3,312 or an average of about 662 per annum. The most fatal year was 1900, with 859 deaths from typhoid fever or a rate of 35.5 per 100,000 population, and the most favorable year was 1903 with 593 deaths and a death rate of 23.7. The average rate for all cities was 31.6 per 100,000 or markedly higher than the rural rate, 23.5. How do these figures compare with outside experience?

According to the last U. S. Census, Michigan's death rate from typhoid fever in 1900 (28.1) was somewhat greater than the average for all of the registration states namely, 25.4 per 100,000. The computation was for the census year ending May 31, 1900, and did not include the exceptionally high mortality from typhoid in the latter part of the calendar year which raised the rate to 35.5 in the table on page 66. These are the rates for the registration states: Connecticut, 27.4; District of Columbia, 80.7; Maine, 28.8; Massachusetts, 22.3; Michigan, 28.1; New Hampshire, 16.8; New Jersey, 21.1; New York, 24.4; Rhode Island, 23.8; Vermont, 31.1.

Certain groups of American cities, according to the U. S. Census, gave the following average death rates from typhoid for the eleven-year period 1890-1900: Cities in New England states, 30; cities in Middle states, 32; cities in Lake states, 48; cities in Southern states, 50; cities in Western Central states, 38; San Francisco, Cal., 37. In the extended list of cities showing death rates per 100,000 white population in 1900, the only cities having typhoid rates over 100 per 100,000 or 1 per 1,000 are the following: Allegheny, Pa., 101.9; Charleston, S. C., 103.1; Newcastle, Pa., 147.1; Pittsburg, Pa., 145.5; Pueblo, Col., 107.8; Youngstown, Ohio, 116.0. So that the fact that at least two Michigan cities had average rates of over 100 for an entire five-year period, while another was very close to this limit, is very significant.

When we come to foreign countries, we may note the very low death rates from typhoid fever according to statistics for the year 1902 in the international data published by the English Registrar-General: England and Wales, 12.6; Scotland, 12.2; Ireland, 13.8; Norway, 4.6; German Empire, 7.0; Hungary, 27.3; Netherlands, 8.6; Belgium, 17.8; Switzerland, 6.2; Spain, 45.8; Italy, 34.6. And in certain foreign cities, according to a very valuable table in the *Annuaire Statistique*, 1903, of the city of Buenos Ayres, there were, for the five-year period 1898-1902, the following rates per 100,000: Buenos Ayres, 22.0; London, 14.4; Paris, 21.7; Berlin, 5.0; Vienna, 5.1; St. Petersburg, 80.7; Madrid, 50.0; Brussels, 17.2; Turin, 22.2; Lisbon, 29.4; The Hague, 5.1; Berne, 7.0; Copenhagen, 13.3; Stockholm, 4.3; Rio Janeiro, 15.9; Santiago de Chili, 48.3; Montevideo, 18.8; Havana, 39.3; San Jose (Costa Rica), 74.9; Milan, 46.2. The fact that the greatest city in the world should have so low a mortality from this filth disease, the highest rate since 1885 having been only 18.0 per 100,000 population in 1899, and the rate for 1903, the lowest on record, being only 8.3, would effectually disprove that there is any necessary connection between the massing of population and increased mortality from this disease. Not a single city in Michigan over 10,000 population can show as low a death rate from typhoid fever as London.

*Extracted from the Michigan Monthly Bulletin of Vital Statistics, August, 1905.

TABLE 35.—*The prevalence of typhoid fever, in Michigan, in each of the twenty-two years, 1884-1905. Compiled from reports to the State Department of Health.**

Years.	Population. (Estimated for interannual years.)	Reported cases.†	Reported deaths.	Deaths per 100 cases.	Deaths per 100,000 of the population.
1884.....	1,853,658	969	290	27	15.6
1885.....	1,893,697	715	194	23	10.2
1886.....	1,933,735	1,194	282	18	14.6
1887.....	1,973,774	3,424	411	17	20.8
1888.....	2,013,812	1,511	310	21	15.4
1889.....	2,053,851	2,530	* 681	27	33.2
1890.....	2,093,889	1,924	304	16	14.5
1891.....	2,130,827	4,670	697	15	32.7
1892.....	2,167,765	2,591	588	21	24.8
1893.....	2,204,703	3,512	594	17	26.9
1894.....	2,241,641	2,805	506	18	22.6
1895.....	2,271,531	3,751	621	17	27.3
1896.....	2,301,421	2,506	409	16	17.8
1897.....	2,331,311	1,900	352	19	15.1
1898.....	2,361,201	2,874	634	24	26.9
1899.....	2,391,091	3,194	638	20	26.7
1900.....	2,420,982	5,122	920	18	38.0
1901.....	2,450,872	3,002	665	22	27.1
1902.....	2,475,499	2,456	596	24	24.1
1903.....	2,502,758	2,840	640	23	28.9
1904.....	2,530,016	3,028	731	24	29.7
1905.....	2,557,275	2,774	661	24	25.8
Averages per year.....	2,234,332	2,695	531	21	23.7

*In an outbreak of typhoid fever at Negaunee, in 1889, 300 cases *but no deaths* were reported, therefore the deaths from typhoid fever for that year reported to the Secretary of State have been used in place of those reported to the State Department of Health.

†Many health officers reported only the fatal cases, so that the total number of cases for each year was much in excess of those given in this column.

TABLE 36.—*The numbers of deaths from typhoid fever,* in Michigan, per 100,000 persons living, in each of the fifteen years, 1869-1883. Compiled from reports to the Secretary of State.*

Years.....	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
Deaths.....	39.0	48.5	29.2	49.4	52.8	45.8	31.3	30.1	30.3	22.6	25.5
Years.....	1880.	1881.	1882.	1883.	Average, 1869-1883.						
Deaths.....	31.9	55.2	28.4	25.0	36.3						

*Includes typho-malarial fever but not typhoid pneumonia.

GEOGRAPHICAL DISTRIBUTION.

Table 37 indicates that, in the fifteen years, 1891-1905, the death rate from typhoid fever was considerably higher than the average for the State for this period (26.04 deaths per 100,000 inhabitants) in the Upper Peninsula and Western Divisions. In the Upper Peninsula, the high rate was due to unusual death rates from this disease in the counties of Baraga, Chippewa, Delta, Gogebic, Luce, Marquette and Menominee; and in the Western Division, to unusual death rates from this disease in the counties of Kent and Mason. Records in this Department show that the unusual death rates in each of the counties named were due to high death rates, in certain years, in the following localities:

BARAGA COUNTY—Baraga township, 1891 and 1899; Baraga village, 1891 and 1899.

CHIPPEWA COUNTY—Superior township, 1899; Sault Ste. Marie city, 1893, 1894, 1900-1905.

DELTA COUNTY—Escanaba city, 1892, 1893, 1897-1905; Gladstone city, 1898, 1899, 1901-1905.

GOGEBIC COUNTY—Bessemer city, 1893, 1894, 1896, 1900 and 1901; Ironwood city, 1891, 1893, 1900, 1904 and 1905.

LUCE COUNTY—Newberry village, 1900, 1903 and 1904.

MARQUETTE COUNTY—Michigamme township, 1891 and 1893; Republic township, 1891 and 1893; Ishpeming city, 1891, 1892, 1894, 1897, 1898, 1900 and 1903; Marquette city, 1892, 1895, 1899, 1900, 1902, 1904 and 1905; Negaunee city, 1891-1894, 1896, 1898, 1902, 1904 and 1905.

MENOMINEE COUNTY—Spaulding township, 1891; Menominee city, 1891-1896, 1899-1901, 1903-1905.

KENT COUNTY—Grand Rapids city, 1891-1905.

MASON COUNTY—Custer township, 1894 and 1900; Ludington city, 1891-1893, 1899 and 1900.

Other counties in the table which show high death rates during the fifteen years, 1891-1905, are Emmet, Ingham, Midland, Missaukee and Otsego, and the localities responsible for the high rates in these counties are as follows:

EMMET COUNTY—Little Traverse township, 1891; Harbor Springs village, 1891, 1893, 1895, 1897, 1903-1905; Petoskey city, 1897-1902.

INGHAM COUNTY—Alaiedon township, 1899 and 1900; Delhi township, 1894, 1895, 1898 and 1899; Ingham township, 1898 and 1899; Lansing township, 1901, 1903 and 1904; Le Roy township, 1898; Locke township, 1903; Meridian township, 1899-1903; Stockbridge township, 1891 and 1892; Vevay township, 1902; Wheatfield township, 1891, 1897, 1901-1905; White Oak township, 1898-1900; Stockbridge village, 1900; Lansing city, 1891-1905.

MIDLAND COUNTY—Ingersoll township, 1898; Larkin township, 1900; Warren township, 1898 and 1901; Coleman village, 1894; Midland city, 1895, 1899, 1901, 1902 and 1904.

MISSAUKEE COUNTY—Norwich township, 1899 and 1900; Reeder township, 1891, 1894 and 1895; Richland township, 1893 and 1900; Riverside township, 1891; Lake City village, 1893; McBain village, 1894 and 1898.

OTSEGO COUNTY—Corwith township, 1891 and 1899; Hayes township, 1900; Gaylord village, 1891, 1898, 1900, 1902-1904.

In addition to the foregoing, there were many of the localities in which the death rates from typhoid fever were higher than the average before-mentioned, but by reason of the low rates of other localities in the same counties, the county rates did not differ materially from the normal.

TABLE 37.—*The geographical distribution of typhoid fever, in Michigan, in the fifteen years, 1891-1905, as indicated by the average numbers of cases and deaths, and the average deaths per 100,000 persons living, in each geographical division shown in the table.*

Geographical division.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
UPPER PENINSULA DIVISION.	237,333	614	85.6	36.1
Alger county.....	4,458	3	.4	9.0
Baraga county.....	4,607	27	3	65.1
Chippewa county.....	18,391	57	8	43.5
Delta county.....	22,461	46	11	49.0
Dickinson county.....	16,656	37	4	24.0
Gogebic county.....	15,707	92	8	50.9
Houghton county.....	55,206	85	13	23.5
Iron county.....	7,261	12	2	27.5
Keweenaw county.....	3,234	5	.8	24.7
Luce county.....	2,865	6	.9	31.4
Mackinac county.....	7,599	4	.5	6.6
Marquette county.....	39,746	142	18	45.3
Menominee county.....	25,008	63	13	52.0
Ontonagon county.....	6,288	13	1	15.9
Schoolcraft county.....	7,846	22	2	25.5
NORTHWESTERN DIVISION.	82,547	97	22	26.7
Benzie county.....	9,307	16	3	32.2
Grand Traverse county.....	19,896	27	5	25.1
Leelanau county.....	10,157	5	2	19.7
Manistee county.....	27,062	26	7	25.8
Wexford county.....	16,125	23	5	31.0
NORTHERN DIVISION.	71,139	110	18.6	26.1
Antrim county.....	14,160	18	4	28.2
Charlevoix county.....	13,010	14	3	23.1
Cheboygan county.....	15,282	19	2	13.1
Crawford county.....	3,038	5	.6	19.7
Emmet county.....	13,490	28	5	37.1
Kalkaska county.....	6,448	9	1	15.5
Otsego county.....	5,711	17	3	52.5
NORTHEASTERN DIVISION.	55,076	45	11.6	21.1
Alcona county.....	5,572	4	.9	16.2
Alpena county.....	18,655	13	4	21.4
Iosco county.....	11,455	8	3	26.2
Montmorency county.....	2,951	3	.6	20.3
Ogemaw county.....	6,907	6	1	14.5
Oscoda county.....	1,795	4	.1	5.6
Presque Isle county.....	7,741	7	2	25.8
WESTERN DIVISION.	267,256	427	80	29.9
Kent county.....	129,176	300	48	37.2
Lake county.....	5,536	7	1	18.1
Mason county.....	19,118	18	6	31.4
Muskegon county.....	37,293	26	7	18.8
Newaygo county.....	18,712	19	5	26.7
Oceana county.....	17,055	25	4	23.5
Ottawa county.....	40,366	32	9	22.3
NORTHERN CENTRAL DIVISION.	99,810	142	27.3	27.4
Clare county.....	8,446	11	2	23.7
Gladwin county.....	6,206	10	1	16.1
Isabella county.....	22,706	32	5	22.0
Mecosta county.....	20,813	23	6	28.8
Midland county.....	14,087	26	5	35.5
Missaukee county.....	8,397	23	4	47.6
Oscoda county.....	17,486	15	4	22.9
Roscommon county.....	1,669	2	.3	18.0

*See † footnote below Table 35, on a preceding page.

TABLE 37.—CONCLUDED.

Geographical division.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
BAY AND EASTERN DIVISION.	341,157	391	80.7	23.7
Arenac county.....	8,366	7	.7	8.4
Bay county.....	62,915	58	19	30.2
Huron county.....	33,754	32	6	17.8
Lapeer county.....	28,184	31	6	21.3
Saginaw county.....	83,130	66	15	18.0
Sanilac county.....	34,603	54	10	28.9
St. Clair county.....	54,858	101	16	29.2
Tuscola county.....	35,347	42	8	22.6
CENTRAL DIVISION.	314,844	429	77	24.5
Barry county.....	23,064	25	3	13.0
Chilton county.....	25,773	44	8	31.0
Eaton county.....	32,067	49	7	21.8
Genesee county.....	41,407	39	8	19.3
Gratiot county.....	29,528	45	8	27.1
Ingham county.....	40,970	92	16	39.1
Ionia county.....	34,879	45	9	25.8
Livingston county.....	19,804	21	3	15.1
Montcalm county.....	33,865	28	8	23.6
Shiawassee county.....	33,487	41	7	20.9
SOUTHWESTERN DIVISION.	140,006	147	32	22.9
Allegan county.....	39,118	29	7	17.9
Berrien county.....	47,628	48	12	25.2
Cass county.....	20,846	24	4	19.2
Van Buren county.....	32,414	46	9	27.8
SOUTHERN CENTRAL DIVISION.	316,059	401	71	22.5
Branch county.....	26,414	34	7	26.5
Calhoun county.....	49,619	70	13	26.2
Hillsdale county.....	30,022	24	5	16.7
Jackson county.....	47,145	77	13	27.6
Kalamazoo county.....	44,698	80	10	22.4
Lenawee county.....	48,671	64	11	22.6
St. Joseph county.....	24,390	22	5	20.5
Washtenaw county.....	45,100	30	7	15.5
SOUTHEASTERN DIVISION.	439,615	306	110	25.0
Macomb county.....	32,754	44	8	24.4
Monroe county.....	33,111	39	8	24.2
Oakland county.....	43,898	31	7	15.9
Wayne county.....	329,852	192	87	26.4

*See † footnote below Table 35, on a preceding page.

LOCAL PREVALENCE OF TYPHOID FEVER.

Table 38 indicates that, in 1905, typhoid fever was more prevalent in urban than in rural localities.

Of the urban localities, the disease was most prevalent in the third group, with populations of from 10,000 to 25,000, and least prevalent in the fifth group, with populations of 5,000, or less.

By a comparison of Table 38 with Table 35, on a preceding page, it will be seen that, in 1905, the death rates of each of the first four groups in Table 38 were considerably higher than the death rate for the State as a whole—25.8 deaths per 100,000 inhabitants.

Table 39 has been prepared for the purpose of learning which localities in each of the four groups in Table 38 were responsible for the high death rates, in their respective groups, in 1905, and in which of them the death rates from typhoid fever have been unusually high in previous years.

For the purpose of learning what, if any, possible relation may exist between the public water supplies and the prevalence of typhoid fever in each of certain localities, the sources of the public water supplies, where definitely known, together with a classification of the same, are given in Table 39.

Beginning with the first group in the tables, it will be seen that in Detroit the death rate from typhoid fever in 1905 was considerably less than the average for that city, and but slightly higher than the rate for rural localities.

While the water supply of Detroit is comparatively pure, and frequent analyses are made to determine its purity, the fact remains that there is an ever present possibility of its infection from the sewage of localities on the St. Clair river. There is also a possibility of its contamination by the flood waters of Connor's Creek, which receives the drainage from a large area northeast of the city, and in which are located two cemeteries, and many truck gardens, stables, compost heaps and privies.

For the reason that over ninety-nine per cent of the people in Detroit are using the city water, the possibility of typhoid infection from the private wells is a matter of minor concern; and for the same reason, the probability of the public water supply being the source of all the typhoid fever in that city is not great, because, if this were so, a much larger number of cases and deaths from this disease would occur.

It is highly probable that much of the typhoid fever in Detroit is spread, through the agency of flies, from the common privies, of which in 1894 there were over 30,000*, or one for every seven or eight persons in the city. In New York city, at the same time, there were about 1,200 privies*; and the death rate from typhoid fever in New York city for the four years ending in 1894, was about fifty-eight per cent less than that of Detroit for the same period.

The second city in group one, Grand Rapids, has a contaminated water supply, and therefore it is not surprising that, in this city, the average death rate from typhoid fever has been about forty-six per cent greater than for the entire State.

The exceptionally high rates in 1904 and 1905 are believed to have been due to the severe flood in the latter part of March, 1904, by which filth was washed out of the privies, and this, together with the already contaminated river water, gained access to very many of the wells.

It should be stated, however, that in 1904, active measures for the restriction of typhoid fever in Grand Rapids were instituted, and the death rate in 1905 was about thirteen per cent less than in the preceding year. From present indications, the death rate in 1906 will be about the same as in 1905.

In the second group of localities, it will be seen that the high death rate of 32.5 per 100,000 was due, principally, to the excessive rates in Jackson and Saginaw.

A study of the average death rates in connection with the water supplies of the cities in group two, reveals the fact that in Saginaw, which is listed as having a contaminated water supply, the rate was very low as compared with the average for the State as a whole and with the rates of many other localities, shown in Table 39, with much better water supplies. Further, that Jackson, with a water supply from artesian wells, and which should be remarkably pure, had an average death rate far in excess of that for the entire State.

*Report of the Detroit Board of Health, 1894.

In group three, which in 1905 had the highest death rate of any group shown in Tables 38 and 39, we find that in 1905, Escanaba had a rate of over six hundred per cent greater than the rate for the State, and in the years 1889-1905 an average rate of over two hundred per cent greater than the average for the State (25.8) during the same period.

A report of Dr. O. C. Breitenbach, on the conditions which have been responsible for the large amount of typhoid fever in Escanaba, was published, in connection with the article on "Typhoid Fever in Michigan in 1904 and preceding years," in the annual report of this Board for 1905.

Other localities in group three which, with Escanaba, were particularly responsible for the high death rate in that group in 1905, are Battle Creek, Ironwood, Lansing, Marquette, Menominee and Sault Ste. Marie; and in each of these localities, the average annual death rate in preceding years was greater, and in many instances very much greater, than the average for the State as a whole. As would naturally be expected, in four out of the seven localities the water supplies are classified as possibly contaminated, and in one—Battle Creek—as contaminated.

The public water supply of Battle Creek is obtained, principally, from an inland lake, which is used extensively as a summer resort, and the dangerous character of this water, and also that from the private wells in the city, was fully discussed at a Sanitary Convention held in that city in 1890. The subject has since been kept fresh in the minds of the people by the Press, and by the continued and unusual prevalence of typhoid fever in that city. In 1898, 100 cases and 13 deaths, and in 1905, 73 cases and 10 deaths, were reported, and there has not been a single year since 1888 when typhoid fever was not present in that city, in many years in unusual amounts.

The reasons for the excessively high rates at Ironwood, where filtration of the water supply is resorted to, are not apparent; and the continued prevalence of typhoid fever in that city during the seventeen years, ending in 1905, would indicate that the causes assigned for the very extensive outbreak in 1893, particulars of which were published in the annual report of this Board for 1894, have not been effectually removed.

The unusual prevalence of typhoid fever in Lansing cannot be traced to the public water supply, which is obtained from deep wells, and is of good quality and free from pathogenic micro-organisms, as shown by many analyses in the past. In view of this fact, and for the reason that, in this city, there are many private wells and very many privies in use, suspicion must rest upon either or both of the latter as the sources of the disease.

The causes of the unusual prevalence of typhoid fever in Menominee were fully and publicly discussed, and exhaustive reports, based upon extensive observations, were made to the city council at the time of the serious outbreak of this disease in that city in the Spring of 1896, notwithstanding which the disease has since been very prevalent, particularly in 1899 and following years. In 1899, 300 cases and 32 deaths from typhoid fever were reported to this Department. The numbers of cases which occurred in 1897, 1898, 1900, 1904 and 1905 are not known because, in these years, the health officers reported only the fatal cases.

In 1890, a serious epidemic of typhoid fever occurred in the city of Sault Ste. Marie, 300 cases and 20 deaths having been reported to this Department. The health officer at that time reported that the water supply was being obtained from the ship canal at a point about midway between the

locks and the upper end of the canal, and that, just prior to the outbreak, three or four hundred vessels had been tied up in the canal for the space of five or six days, during repairs to the locks. In 1900, another serious outbreak occurred with 400 cases and 14 deaths. A year or two later, the intake of the water supply was removed to a point two or three miles above the city, and the water supply is now considered safe from contamination. The high death rate from typhoid fever in that city in recent years was stated by the Secretary of the local board of health to be due to cases from outside which are brought from camps or removed from vessels for hospital treatment.

In the fourth group of localities, the death rate shown in Table 38 was but slightly greater than that for the State as a whole, and but for the unusual numbers of deaths from typhoid fever in Cadillac, Delray, Hancock, Ionia, Mt. Clemens, Negaunee and Wyandotte, the rate for this group would have been less than that for the State, or for the rural localities.

With one exception—Ionia—the localities in group four which in 1905 had unusual death rates from typhoid fever, show also unusual death rates for the period 1889-1905, and five out of the seven localities are supplied with water from supposedly safe sources.

In view of the fact that in Cadillac in 1897 there were 732 private connections with the city water mains, and an average daily consumption of 905,975 gallons of water,—indicating a general use of the city water—the high death rates from typhoid fever, both in 1905 and in the average year, coupled with the fact that typhoid fever was present in that city in fifteen out of the seventeen years ending in 1905, would indicate a possible contamination of the public water supply.

The unusual death rates from typhoid fever in Delray, are probably accounted for by the general insanitary condition of the locality, described in the annual report of this Department for 1897.

The very high death rate from typhoid fever in Hancock in 1905—76.5 per 100,000—is not considered very unusual for that locality when compared with the average for the six preceding years—69.3 per 100,000.

The numbers of cases of typhoid fever which occurred in Hancock in the seven years ending with 1905 are not known, the health officers reporting only the fatal cases.

A report, by a committee of the State Board of Health, upon a proposed water supply for Hancock is printed in the annual report of the Board for 1892.

While the death rate from typhoid fever in Ionia in the seventeen years, ending in 1905, was but 20 per 100,000, the death rate in the last five years of this period was 49.8 per 100,000.

At a Sanitary Convention held at Ionia in 1883, the water supply of that city was very ably discussed by Dr. O. R. Long, and it was then pointed out that while the public water supply was at that time comparatively pure, two of the six springs which constituted the main supply were liable to contamination, and that as the city grew and encroached upon the land from which the water supply was derived, the entire water supply would be liable to contamination by surface drainage. Further, that the careless management of the water works plant might result in the admission to the city storage well of water, of acknowledged impurity, from an open reservoir held in reserve for use in cases of protracted fires. The unusual prevalence of typhoid fever in that city would seem to indicate a fulfillment of the prognostications just referred to.

It is a strange coincidence that the two cities—Ironwood and Mt. Clemens—which have adopted systems of filtration of the public water supplies, the source of which in each case is a river, should have unusually high death rates from typhoid fever.

The death rate from Mt. Clemens during the eight years ending in 1905, and in which the disease was most prevalent, was 66.5 per 100,000, or about 58 per cent greater than the average for the entire State during this period. The most serious outbreak occurred in 1900, when there were 159 cases and 15 deaths in the city itself, and 35 cases and 7 deaths in other localities, the source of contagium in each of which was traced to Mt. Clemens.

Negaunee has the distinction of having the highest average annual death rate from typhoid fever of any locality shown in Table 39, and the disease was present in that locality in every year since 1889, and probably for many years prior to that time. In 1889, 300 cases, but no deaths, were reported; in 1892, 120 cases and 10 deaths; in 1893, 118 cases and 15 deaths, and in 1902, 67 cases and 10 deaths.

In 1891, the State Board of Health recommended a more desirable source than Teal Lake for the water supply of Negaunee, and also made several recommendations relative to the protection of the water in this lake against contamination, in case a more desirable source could not be found.

Wyandotte, with its water supply from the river into which the infected sewage of Detroit and many other localities, and the excreta and filth from thousands of vessels annually, is discharged, could scarcely expect to escape with a low death rate from typhoid fever. The wonder is that the average annual death rate is not infinitely greater than that shown in Table 39—85.8 per 100,000. The average for the years 1895-1905—when the disease was most prevalent in this locality—was 113.5 per 100,000. The numbers of cases in the past three years is not known, because the health officers reported only the fatal cases.

It is very probable that most of the sickness from typhoid fever in the smaller cities, and in the villages, is due to the use of shallow wells, the water in which, in such locations, is always liable to contamination by the leachings from cesspools and privies, and by surface filth carried down into the subsoil with the rainfall. To a lesser extent, it is probably spread, through the agency of flies, directly from the common privies, which are usually constructed without any regard to the exclusion of flies, or the prevention of the contamination of the ground under them. The provision of a pure public water supply for each such community; the closing of all private wells which do not pass through an impervious bed of clay or rock, or which are liable to contamination from any source whatever; the abolition of all cesspools and privies, and the construction and compulsory use of sanitary sewers; would, it is believed, render the spread of typhoid fever in such a community practically impossible.

In connection with the study of the prevalence of typhoid fever in urban and rural localities, the following article, which first appeared in "Engineering News" of October 26, 1905, and was reprinted in the "Michigan Monthly Bulletin of Vital Statistics" for November, 1905, is considered of sufficient interest and importance to merit republication in this report:

SOME URBAN AND RURAL ASPECTS OF TYPHOID FEVER.*

Disgraceful typhoid fever records are shown for a number of Michigan cities in the August number of the "Michigan Bulletin of Vital Statistics." Thus Escanaba had an average typhoid mortality of 114.3 per 100,000 for the five-year period, 1900-4, with the enormous rate of 360.4 for the last year of the period. Sault Ste. Marie had a five-year rate of 111, "but more persistently high annual rates" than Escanaba. The population of each of these cities was about 11,000 by the State Census of 1904. Menominee, with about the same population, showed an average of 66.9 typhoid deaths per 100,000 for the same five years. The 19 cities having populations ranging from 5,000 to 10,000 in 1904 had an average typhoid mortality of 40.1 per 100,000 for the five years; 8 of these 19 cities averaging over 40 and only 3 averaging under 20 per 100,000 for the period. Of the 6 largest cities in the State, Jackson showed 48.3 and Grand Rapids 44.1 deaths per 100,000 for the five years, their respective populations being 25,300 and 95,718. Turning to more creditable records, we find that of the 6 largest cities Detroit (317,591 population) had the lowest average for the five years, 23.3 per 100,000. This is too high, but we are pleased to note that it is the average of a generally falling yearly rate. In the cities of 10,000 to 25,000 population the five-year averages for the three lowest cities are Muskegon (20,897 population), 18.2; Manistee (12,708), 17.8; Ann Arbor (14,599), 15.1.

The foregoing figures would mean more had we an acknowledged standard of comparison. Recognizing this, Dr. Cressy L. Wilbur, Editor of the Bulletin already named, and Chief of the Division of Vital Statistics, has incorporated in the review from which our figures are taken some figures for American and foreign cities.†

* * * * *

After allowing for various facts that tend to make some of these statistics uncomparable, the contrast between typhoid mortality at home and abroad is a great disgrace to the cities of the United States. There is also a marked contrast between the New England, and middle groups of states and the Lake and Southern groups, greatly to the disadvantage of the latter. But even the New England rate of 30 per 100,000 is far too high.

We venture to suggest, perhaps not for the first time, that an average of more than 20 typhoid deaths per 100,000 for a period of years indicates that something is wrong with the public water supply of a city.

In the larger cities, where a few deaths, more or less, do not cause great variations in the rates, the 20 per 100,000 standard might be applied to a single year, instead of to a period of years.

Assuming as intelligent sanitary control of the milk supply and of other means of typhoid infection as our most progressive cities now give to the water supply, the average typhoid mortality ought to fall to 15, if not to 10 per 100,000. But not even the first of these standards will often be attained until a great improvement in rural sanitation is effected. The rural population is largely responsible for typhoid infected water, and primarily to blame for typhoid infected milk. Its careless practices, also, combined with the heedlessness of most "summer boarders," give rise to much of the city typhoid, which is almost invariably higher shortly after the return of city people from their vacations.

In seeming conflict with some of the ideas just expressed are the typhoid statistics for the rural districts, which, as a rule, if not invariably, are lower than those for urban sections. But it must be remembered, to begin with, that death statistics in the country are far less complete than in the city, and that diagnoses of such diseases as typhoid are also less accurate in the country. Moreover, epidemics of typhoid are far less likely in the country than in the city, even when infection arises in the country. This, of course, is due to the relative isolation of country people and to what may be termed their self-contained methods of living. The dangers of an infected farm well may be confined to the single family living on the farm, but the water from the well may be used to wash milk cans or water milk, and thus spread typhoid germs to hundreds in the city, against five or ten on the farm itself. In water epidemics the contrasts between rural and city exposure to infection from a farm or country house case are even greater, as witness the Plymouth, Butler, Ithaca and other great typhoid epidemics.—Engineering News, October 26, 1905.

*From the Michigan Monthly Bulletin of Vital Statistics, November, 1905.

†Quoted on page 83.

TABLE 38.—*The prevalence of typhoid fever in urban and rural localities, in Michigan, in 1905.*

Localities.—Grouped according to density of population.	Estimated population.	Health jurisdictions.			Cases.*	Deaths.	Death rates per 100,000 of the population.
		Total.	Infected.				
			Number.	Per cent of all jurisdictions.			
Cities over 50,000.....	423,319	2	2	100	589	123	29.1
Cities from 25,000 to 50,000.....	144,748	4	4	100	197	47	32.5
Cities from 10,000 to 25,000, and Calumet township (17,518).....	257,596	18	17	94	292	93	36.1
Cities and villages from 5,000 to 10,000†.....	147,649	23	20	87	153	43	29.1
Cities and villages under 5,000†.....	375,013	364	150	41	464	101	26.9
Total urban.....	1,348,325	411	193	47	1,695	407	30.2
Balance of localities—principally townships‡.....	1,208,950	1,229	456	37	1,079	254	21.0

*This footnote is below Table 35, on a preceding page.

†Exclusive of twenty-seven villages in the two groups, for which the populations in 1905 cannot be correctly estimated.

‡Includes the twenty-seven villages mentioned in the preceding paragraph, but does not include Calumet township, which, for the purpose of this study, is included in the third group of urban localities, which have corresponding populations.

TABLE 39.—The prevalence of typhoid fever, in 1905 and preceding years, in localities of 5,000 inhabitants and over. Also the source of the public water supply and the possibility, or otherwise, of its being contaminated.

Localities.—Grouped according to population.	1905.				Average 1889-1905.				Water supply.		Source.
	Population.	Cases.	Deaths.	Deaths per 100,000 inhabitants.	Population.	Cases.	Deaths.	Deaths per 100,000 inhabitants.	Classification.		
POPULATION OF 50,000 AND OVER:											
Detroit.....	825,563	*	70	21.5	261,743	*	71	27.1	Possibly contaminated.		Great lakes.
Grand Rapids.....	97,756	518	53	54.2	81,074	254	39	48.1	Contaminated.....		Shallow wells and river.
POPULATION 25,000 TO 50,000:											
Bay City.....	† 40,615	12	11	27.1	28,397	31	11	38.7	Possibly contaminated.		Great lakes.
Jackson.....	25,330	88	15	50.2	23,523	44	8	34.0	Probably uncontaminated.		Artesian wells.
Kalamazoo.....	31,127	65	5	16.1	23,209	50	7	30.2	Probably uncontaminated.		Surface and artesian wells.
Saginaw.....	- 47,676	32	16	33.6	44,805	34	9	20.1	Contaminated.....		River.
POPULATION 10,000 TO 25,000:											
Adrian.....	10,937	0	0	0	9,642	17	3	31.1	Probably uncontaminated.		Surface and artesian wells.
Albion.....	12,550	6	4	31.9	11,914	9	3	25.2	Possibly contaminated.		Great lakes.
Ann Arbor.....	14,622	8	2	13.7	12,448	7	2	16.1	Probably uncontaminated.		Flowing wells and springs.
Battle Creek.....	23,126	73	10	43.2	17,335	29	6	34.6	Contaminated.....		Inland lake.
Escanaba.....	11,485	*	21	182.8	8,888	*	7	78.8	Contaminated.....		Great lakes.
Flint.....	15,329	8	8	39.6	12,018	13	3	25.0	Probably uncontaminated.		River.
Ironwood.....	10,668	*	6	59.4	9,236	*	6	65.0	(?).....		
Ishpeming.....	11,215	7	1	8.9	12,003	52	6	50.0	Probably uncontaminated.		Inland lake.
LaSalle.....	21,224	13	11	51.8	16,397	42	7	42.7	Probably uncontaminated.		Deep wells.
Manistee.....	12,320	10	1	8.1	13,372	10	2	15.0	Probably uncontaminated.		Deep wells.
Marquette.....	10,817	17	4	37.0	9,886	19	3	30.3	Possibly contaminated.		Great lakes.
Menominee.....	20,918	*	6	56.3	11,876	*	10	84.2	Possibly contaminated.		Great lakes.
Muskegon.....	20,918	30	6	28.7	21,085	17	4	19.6	Possibly contaminated.		Great lakes.
Pontiac.....	11,163	4	3	26.9	8,531	5	1	11.7	Probably uncontaminated.		Artesian wells.
Port Huron.....	20,246	10	4	19.8	19,023	28	5	20.3	Probably uncontaminated.		Great lakes.
Sault Ste. Marie.....	20,246	21	8	68.6	8,763	55	6	68.5	Probably uncontaminated.		Great lakes.
Traverse City.....	11,698	36	2	17.1	7,656	11	2	26.1	Probably uncontaminated.		Great lakes.
West Bay City.....	17,518	16	1	5.7	12,836	9	3	23.4	Contaminated.....		River.
Calumet.....	17,518	16	1	5.7	13,142	32	4	30.4	Probably uncontaminated.		Great lakes.
POPULATION 5,000 TO 10,000:											
Albion.....	5,049	0	0	0	4,537	6	9	19.8	Probably uncontaminated.		Deep wells.
Benton Harbor.....	6,737	2	1	14.8	5,611	7	1	17.8	Probably uncontaminated.		Deep wells.
Cadillac.....	7,117	33	4	56.2	5,607	9	2	35.7	Probably uncontaminated.		Inland lake.
Cheboygan.....	6,790	8	2	29.5	6,017	10	1	15.1	Probably uncontaminated.		Artesian wells.
Coldwater.....	6,227	*	10	16.1	5,744	13	2	34.8	Probably uncontaminated.		Deep wells.
Delray.....	7,141	*	4	56.0	5,086	*	2	39.3	(No public supply.)		

	5,363	6	1	18.6	5,063	2	.7	13.8	
Grand Haven.....	6,534	*	5	76.5	3,210	*	1	30.1	Probably uncontaminated.....
Hancock.....	9,294	6	1	10.8	2,727	7	2	23.5	Probably uncontaminated.....
Holland.....	5,225	10	4	76.6	5,667	5	1	29.0	Probably uncontaminated.....
Iron Mountain.....	8,121	2	2	23.8	5,597	32	4	47.0	Probably uncontaminated.....
Lathrup.....	7,852	7	0		8,153	6	2.8	19.4	(No public supply)
Madison.....	6,500	7	1	13.7	7,565	6	2	26.4	Probably uncontaminated.....
Monroe.....	7,241	12	3	41.4	5,469	4	2.9	16.4	Probably uncontaminated.....
Mt. Clemens.....	6,763	13	3	44.3	6,031	14	2	33.2	Probably uncontaminated.....
Negaunee.....	5,028	2	1	19.8	6,438	52	6	93.2	Probably uncontaminated.....
Norway.....	9,957	2	2	21.6	3,831	2	2.6	13.7	Possibly uncontaminated.....
Novosel.....	5,461	11	1	19.4	8,206	14	1	24.4	Possibly uncontaminated.....
Pecoskey.....	5,324	2	0	0	4,274	9	1	23.4	Possibly uncontaminated.....
St. Joseph.....	5,486	1	0	0	5,701	3	.6	12.8	Possibly uncontaminated.....
Windsore.....	** 5,034	*	7	127.0	5,034	4	4	85.8	(No public supply)
Wyandotte.....	7,639	0	0		4,663	*	.7	11.9	Possibly contaminated.....
Ypsilanti.....					6,719	5		40.3	Probably uncontaminated.....

Open and driven wells.

Great lakes.

Driven wells.

Springs and artesian wells.

Artesian wells.

Great lakes.

Great lakes.

Wells.

Inland lake.

Mine shaft.

Wells and spring.

Wells.

Great lakes.

River connecting great lakes.

Wells at springs.

*Fatal cases only reported in recent years.

†Includes West Bay City, with which it was consolidated in 1905.

‡Average 1889-1904. Does not include West Bay City.

§Average 1893-1905.

||Average 1889-1904.

¶Average 1897-1905.

**Population in 1904.

††Incorporated in 1901, and but one census taken, therefore, no means of estimating population for years prior

or subsequent to 1904.

‡‡The facts relative to the water supplies were obtained principally from "The Manual of American Water Works," by M. N. Baker, 1897 edition; and the classification of the water, in respect to the possibility of its contamination, etc., from page 61, of Reprint 559, of this Department. Late information received at this Office has changed the classification of the water supplies of a few localities from that shown in the Reprint.

From 1889 to 1892, inclusive, the disease was present but not reported to this Department.

THE REPORTED SOURCES OF CONTAGIUM IN TYPHOID FEVER.

Table 40 indicates that, in the fifteen years, 1891-1905, over sixty-three per cent of all the cases of typhoid fever were not traced to their source. This is to be regretted, because if in any outbreak of typhoid fever, the source of the disease is promptly located and removed, and proper measures taken to prevent the further spread of the disease from the sick person, or persons, the disease may usually be restricted to those persons who were infected prior to the recognition of the disease at the beginning of the outbreak.

Of the cases of typhoid fever in which a source of contagium was given, fifty-nine per cent were said to be due to water or ice. This number would be much greater if the sources of all the cases were traced. For instance, in Grand Rapids, which has a contaminated water supply, there are several hundred cases of typhoid fever in each year, most of which are undoubtedly due to the water supply, and yet a source is not usually reported. This is also true of many other localities in which the water supplies are the undoubted source of the typhoid fever, but the connection is not traced or reported to this Department.

The comparatively large number of cases in which the infection was traced to outside jurisdictions, included, principally, those cases in which the patients were taken sick in a camp, or other place, away from home, and were removed to their homes, or to a hospital, in other health jurisdictions, to be cared for. The localities from which and to which typhoid fever was spread in 1905 are shown in Table 40a.

The removal, from one locality to another, of a person suffering from typhoid fever is a dangerous practice, and is unlawful unless the same is done with the consent and under the supervision of the health officials of the locality to which the patient is to be removed.

The 2,429 cases which were said to be due to coming in contact with or nursing typhoid fever patients were probably due, in the main, to the neglect of proper precautions on the part of those in attendance upon the patients. Where the utmost care and cleanliness is observed by those in charge of cases of typhoid fever, cases due to secondary infection should be of rare occurrence. It often happens, however, that the nursing is done by some member of the family, who may also handle food, or assist in the preparation of meals, to be eaten by herself and other members of the family; and the hands may not always be disinfected and cleansed between the act of caring for the patient and the handling of the food.

It is probable that many of the cases of typhoid fever which occurred in the same household, camp, etc., and which were reported as due to secondary infection, were really due to the same source as the original case, or to primary infection.

An insanitary condition of premises, on which a case of typhoid fever occurred, would be considered a cause of typhoid fever only in so far as it might assist in the development and distribution of the germs of the disease. Thus, a badly constructed or neglected privy or cesspool might be an eyesore or a source of discomfort to those in the immediate vicinity for many years, and yet not be a cause of typhoid fever. Further, the leachings from such privy or cesspool might find their way into and contaminate the water supply, and the water be consumed without any apparent danger to those using it. But with the entrance to such privy or cesspool of the discharges from a person suffering, or recently recovered, from typhoid fever, these receptacles would then become centers of infection, and a positive

danger to those living in their immediate vicinity, and to those using the water from any source into which the leachings from such receptacles might find their way. It is probable that very many of the 1,360 cases of typhoid fever in Table 40, attributed to insanitary surroundings, were due to infected water, and, in some instances, to infected milk or other food.

Cases of typhoid fever due to infected food are difficult to trace, and it is probable that the one per cent of cases, shown in Table 40, attributed to this source, does not nearly represent the actual number of cases resulting therefrom.

The cases of typhoid fever due to milk infection are probably represented to a considerable extent by the numbers of deaths from this disease in children under five years of age, and which constitute about four and one-half per cent of all the deaths from this disease.

The transmission of typhoid fever by flies is believed to play a more important part in the spreading of this disease than is generally supposed, but the connection between this source and individual cases of the disease cannot ordinarily be traced by those in charge of the public health service of the State. Wherever a common privy exists, there will always be a possibility of the infection of the contents of the pit by the discharges from an incipient or ambulatory case of typhoid fever, and a strong probability of its infection during and for some time subsequent to an outbreak of this disease on the premises where the privy is located. As there is little, if any, effort made to exclude the common house-fly from the common privies, and, in many instances, a very imperfect exclusion of them from our homes, from stores where articles of food are exposed for sale, and from the rooms where cases of typhoid fever are present, the probability of infection of food in the home and in the store is ever present.

It is possible that some of the fourteen cases of typhoid fever, in Table 40, attributed to infected houses and articles of clothing, etc., were really due to infection in a well, privy or cesspool, rather than to infection in the house itself.

TABLE 40.—*The principal reported sources of contagium in 47,025 cases of typhoid fever in Michigan, in the fifteen years, 1891-1905.*

Reported sources.	Number of cases.	Per cent of cases in which the source was known.
Water and ice.....	10,177	59.2
Outside jurisdiction.....	3,011	17.5
From a previous case (personal contact, nursing, etc.).....	2,429	14.1
Insanitary surroundings (defective sewerage, filth, etc.).....	1,360	7.9
Milk and other foods.....	172	1.0
Flies.....	38	.2
Infected houses, and articles of clothing, etc.....	14	.1
Source not stated or doubtful*.....	29,824	† 63.42

*In each year, many cases in this group belonged to outbreaks which began in a preceding year, and the source of contagium may have been traced and reported when the outbreak first began.

†Per cent of all cases which were reported.

TABLE 40a.—*Localities from which and to which typhoid fever was spread, during the year 1905.*

Spread from:	To:	Spread from:	To:
Alpena County, Alpena City.	Alcona County, Haynes Township.	Emmet County, Petoskey City.	Sanilac County, Brown City Village.
Baraga County, Baraga Village.	Keweenaw County, Allouez Township.	Grand Traverse County, Green Lake Township.	Benzie County, Inland Township.
Barry County, Hastings City.	Barry County, Woodland Village.	Grand Traverse County, Green Lake Township.	Isabella County, Isabella Township.
Bay County, Bay City.	Kent County, Sparta Village.	Grand Traverse County, Traverse City.	Benzie County, Joyfield Township.
Bay County, Bay City.	Midland County, Larkin Township.	Grand Traverse County, Traverse City.	Grand Traverse County, Paradise Township.
Bay County, Bay City.	Ogemaw County, West Branch City.	Gratiot County, Alma City.	Gratiot County, Arcada Township.
Benzie County, Frankfort Village.	Benzie County, Benzonia Township.	Gratiot County, Alma City.	Gratiot County, Bethany Township.
Berrien County, Benton Harbor City.	St. Joseph County, Flowerfield Township.	Gratiot County, Alma City.	Tuscola County, Caro Village.
Berrien County, St. Joseph City.	Berrien County, Benton Township.	Gratiot County, Alma City.	Tuscola County, Fairgrove Township.
Calhoun County, Battle Creek City.	Eaton County, Olivet Village.	Gratiot County, Alma City.	Genesee County, Flushing Village.
Clinton County, St. Johns City.	Clinton County, Greenbush Township.	Gratiot County, Alma City.	Gladwin County, Gladwin City.
Eaton County, Sunfield Village.	Barry County, Middleville Village.	Gratiot County, Alma City.	Gratiot County, Hamilton Township.
Emmet County, Bear Creek Township.	Kent County, Gaines Township.	Gratiot County, Alma City.	Livingston County, Howell Village.
Emmet County, Petoskey City.	Huron County, Bad Axe City.	Gratiot County, Alma City.	Tuscola County, Indian Fields Township.
Emmet County, Petoskey City.	Huron County, Elkton Village.	Gratiot County, Alma City.	Gratiot County, Ithaca Village.
Emmet County, Petoskey City.	St. Clair County, Port Huron City.	Gratiot County, Alma City.	Genesee County, Linden Village.

TABLE 40a.—CONTINUED.

Spread from:	To:	Spread from:	To:
Gratiot County, Alma City.	Mason County, Ludington City.	Kent County, Grand Rapids City.	Kent County, Sparta Village.
Gratiot County, Alma City.	Saginaw County, Merrill Village.	Kent County, Grand Rapids City.	Muskegon County, Sullivan Township.
Gratiot County, Alma City.	Iosco County, Oscoda Village.	Kent County, Grand Rapids City.	Newaygo County, Newaygo Village.
Gratiot County, Alma City.	Ionia County, Ronald Township.	Kent County, Sparta Village.	Kent County, Grand Rapids City.
Gratiot County, Alma City.	Lenawee County, Tecumseh Village.	Kent County, Sparta Village.	Kent County, Rockford Village.
Houghton County, Duncan Township.	Marquette County, Marquette City.	Lake County, (Camp).	Oscoda County, Leroy Township.
Ingham County, Lansing City.	Genesee County, Davison Village.	Lapeer County, North Branch Township.	Lapeer County, North Branch Village.
Ingham County, Lansing City.	Huron County, Pigeon Village.	Livingston County, Fowlerville Village.	Livingston County, Brighton Village.
Ingham County, Lansing City.	Allegan County, Watson Township.	Livingston County, Howell Township.	Livingston County, Genoa Township.
Iron County, Stambaugh Township.	Iron County, Iron River Township.	Luce County, Newberry Village.	Marquette County, Marquette City.
Isabella County, Mt. Pleasant City.	Isabella County, Coe Township.	Luce County, Newberry Village.	Antrim County, Star Township.
Kent County, Grand Rapids City.	Kent County, Algoma Township.	Macomb County, Bruce Township.	Macomb County, Ray Township.
Kent County, Grand Rapids City.	Lenawee County, Clinton Village.	Macomb County, Utica Village.	Oakland County, Troy Township.
Kent County, Grand Rapids City.	Mason County, Custer Village.	Manistee County, Manistee City.	Manistee County, Filer Township.
Kent County, Grand Rapids City.	Montcalm County, Howard City Village.	Manistee County, Manistee Township.	Manistee County, Filer Township.
Kent County, Grand Rapids City.	Wayne County, Plymouth Village.	Manistee County, Springdale Township.	Manistee County, Bear Lake Township.

TABLE 40a.—CONTINUED.

Spread from:	To:	Spread from:	To:
Manistee County, Springdale Township.	Manistee County, Brown Township.	Sanilae County, Sandusky City.	Sanilae County, Argyle Township.
Mason County, Victory Township.	Mason County, Ludington City.	Schoolcraft County, Doyle Township.	Schoolcraft County, Manistique City.
Missaukee County, Norwich Township.	Isabella County, Mt. Pleasant City.	Upper Peninsula, (Locality not given).	Grand Traverse County, Traverse City.
Monroe County, Monroe Township.	Monroe County, Maybee Village.	Upper Peninsula, (Locality not given).	Wexford County, Cadillac City.
Montcalm County, Crystal Township.	Oceana County, Weare Township.	Van Buren County, Decatur Village.	Van Buren County, Waverly Township.
Montmorency County, Albert Township.	Arenae County, Clayton Township.	Van Buren County, Hartford Village.	Berrien County, Watervliet Village.
Montmorency County, Albert Township.	Arenae County, Deep River Township.	Washtenaw County, Ann Arbor City.	Genesee County, Flint City.
Oakland County, Milford Village.	Livingston County, Fowlerville Village.	Washtenaw County, Chelsea Village.	Washtenaw County, Ann Arbor City.
Oscoda County, Marion Village.	Wexford County, Cadillac City.	Wayne County, Detroit City.	Oakland County, Milford Village.
Ottawa County, Zeeland Village.	Ottawa County, Zeeland Township.	Wayne County, Trenton Village.	Lenawee County, Seneca Township.
Presque Isle County, Onaway City.	Alpena County, Alpena Township.	Wayne County, Wyandotte City.	Monroe County, Berlin Township.
Presque Isle County, Onaway City.	Alcona County, Haynes Township.	Wayne County, Wyandotte City.	Monroe County, Monroe Township.
Presque Isle County, Onaway City.	Arenae County, Turner Township.	Wayne County, Wyandotte City.	Wayne County, Van Buren Township.
Saginaw County, Saginaw City.	Grand Traverse County, Green Lake Township.	Wexford County, Cadillac City.	Grand Traverse County, Green Lake Township.
Saginaw County, Zilwaukee Township.	Saginaw County, Saginaw City.	Wexford County, Cadillac City.	Wexford County, Clam Lake Township.
St. Clair County, Marine City.	St. Clair County, Ira Township.	Wexford County, Cadillac City.	Wexford County, Cullax Township.

TABLE 40a.—CONTINUED.

Spread from:	To:	Spread from:	To:
Wexford County, Cadillae City.	Wexford County, Harring Township.	Indiana, Lafayette.	Saginaw County, Tittabawassee Township.
Wexford County, (Camp).	Oseola County, Leroy Township.	Indiana, (Locality not given).	St. Joseph County, Florence Township.
Wexford County, (Camp).	Lake County, Chase Township.	Indiana, (Locality not given).	Saginaw County, St. Charles Township.
Wexford County, (Camp).	Manistee County, Filer Township.	Indiana, (Locality not given).	Washtenaw County, Northfield Township.
Wexford County, (Camp).	Oseola County, Burdette Township.	Indiana, South Bend.	Ottawa County, Allendale Township.
Wexford County, (Camp).	Mackinac County, St. Ignace City.	New York, (Locality not given).	Shiawassee County, Antrim Township.
Wexford County, (Camp).	Midland County, Jerome Township.	New York, Tonawanda.	Presque Isle County, Rogers Village.
FROM OUTSIDE THE STATE TO LOCALITIES IN MICHIGAN.		Ohio, (Locality not given).	Ionia County, Campbell Township.
Spread from.	To.	Ohio, (Locality not given).	Jackson County, Jackson City.
Canada, (Locality not given).	Huron County, Bloomfield Township.	Ohio, (Locality not given).	Ogemaw County, Rose Township.
Florida, (Locality not given).	Kent County, Cedar Springs Village.	Ohio, Bowling Green.	Monroe County, Bedford Township.
Florida, (Locality not given).	Macomb County, Washington Township.	Ohio, Cleveland.	St. Joseph County, Constantine Village.
Illinois, Chicago.	Berrien County, Berrien Springs Village.	Ohio, Cleveland.	Jackson County, Jackson City.
Illinois, Chicago.	Calhoun County, Battle Creek City.	Ohio, Toledo.	Hillsdale County, Wright Township.
Illinois, Chicago.	Hillsdale County, Hillsdale City.	Ohio, Toledo.	Jackson County, Springport Village.
Indiana, Indianapolis.	St. Clair County, St. Clair Township.	Ohio, Toledo.	Monroe County, Bedford Township.

TABLE 40a.—CONCLUDED.

Spread from:	To:	Spread from:	To:
Ohio, Toledo.	St. Clair County, Port Huron City.	Pennsylvania, Philadelphia.	Livingston County, Conway Township.
Ohio, Toledo.	Lenawee County, Palmyra Township.	Pennsylvania, Pittsburg.	Lapeer County, Almont Village.

RESTRICTIVE AND PREVENTIVE MEASURES.

Table 41 indicates that, in 1905, in a large number of instances, the disinfection of the discharges, and of clothing and other articles soiled by the discharges, of typhoid fever patients, was enforced. This is very gratifying, because it is mainly through the discharges that the disease is spread. This does not, however, include the discharges from patients prior to the recognition of the disease and for some time subsequent to apparent recovery, nor the discharges from ambulatory cases which are seldom, if ever, recognized, all of which are believed to be fruitful sources of the disease.

So far as can be learned, the disinfection of rooms in which the patients were sick was enforced in but fifty per cent of the cases. This may be due, in some measure, to a lack of recognition of the importance of this precautionary measure.

Judging by the per cent of cases in which the isolation of the patient was enforced, the necessity for this restrictive measure is quite generally recognized. This is also true, though to a less extent, in respect to the placarding of premises. It is sometimes urged that if proper precautions are taken in the care of typhoid fever patients the isolation of the sick and the placarding of premises are not necessary. To this it should be stated, that inasmuch as strict precautions are not always observed in such cases, and for the further reason that many prominent medical men, in this and other countries, are advocates of the theory of the communicability of typhoid fever directly from patient to nurse, and to others who may come in contact with them, members of the families of those sick, other than those who may be in attendance upon the sick, should be excluded from the sick room, and the public should be warned against visiting the houses, and especially against drinking the water from any wells or making use of any outhouses on the premises where the disease is present.

As indicated in the footnote of Table 41, the boiling of the drinking water, in cases where the water supplies were believed to have been the sources of the typhoid fever, was carried out in about one-third of the cases. The boiling of suspected water, for strictly drinking purposes, does not entail much time or labor, and is an absolute safeguard against the communication of typhoid fever through this agency. There is an objection, however, especially in very warm weather, to the drinking of water which has been boiled and thus rendered insipid, but the protection which the boiling affords should more than offset any objection of this nature.

In this connection, the following extract from the pen of Samuel Hopkins Adams will be of interest:

*Typhoid fever can be banished.**

"The average city of 100,000 inhabitants wastes, perhaps, \$500,000 a year on the luxury of having typhoid, and probably \$100,000 more in efforts to avoid it. That amount of money properly spent would practically eradicate the disease. We have seen it done in the principal European cities: yet with the unprogressiveness in matters of public health which so strangely contrasts with the forwarding American spirit, our cities have continued to poison themselves and one another. I once heard a distinguished sanitarian say: 'Give me a few million dollars and the power to enforce the laws, and I'll make any city in the world typhoid-proof.'

"Pure water and the equipment to keep it pure was his scheme. It is so simple, so saving of grief, pain, and even of cash, that one wonders why civilization continues to permit a disease that ought to be as nearly obsolete as its distant cousin, typhus.

"All typhoid is traceable to polluted water. If, for a year, the world were to stop drinking diluted sewage, typhoid fever would vanish from our vital statistics. Nine-tenths of all infection comes direct from bad water; the other tenth would disappear if the principal causes were eliminated. Infected cities—and nearly all of our large cities are constantly infected—get the disease in one of two ways. They drink water polluted either by themselves or by others. Lake communities drink their own offscourings. Residents of river municipalities welcome to their warm and hospitable interiors the germs which come down-stream to them from diseased cities or rural districts directly infected, above, and having poisoned themselves therewith, pass them on to the waiting settlements further along the current."

An important decision by the Supreme Court of Michigan, relative to the powers of local health officials in the restriction and prevention of typhoid fever, is given below:

SUPREME COURT.

Frank E. Thomas,
Relator and Appellee,
v.

Board of Supervisors of
Ingham County,

Respondent and Appellant.

The following statement of fact is taken from the brief of counsel for the respondent.

"In September, 1904, the city council of the city of Mason, in Ingham County, acting as a board of health, employed Dr. Thomas, the appellee, to attend a typhoid fever patient, residing in that city. The doctor rendered the services required, his first visit being on September 8th, 1904, and his last on October 10th, of the same year. His entire bill came to \$36.00 and was reasonable in amount."

"Thereupon the local board of health approved and certified to a properly itemized statement of the doctor's services, and he presented the same to the board of supervisors of said county for allowance and payment, under the provisions of Section 4424 of the Compiled Laws of 1897 as amended by Act No. 7 of the Public Acts of 1903. The bill was presented in two parts, one at the October session of said board in 1904, and the other at the January session in 1905, but the whole matter was finally treated as one bill, and was entirely disallowed by the supervisors at their January session, after fully hearing the claimant and such testimony as he cared to produce in its support."

"The board of supervisors rejected the claim on the ground that typhoid fever was not, in their opinion, a 'dangerous, communicable disease,' within the meaning of the statute, and for no other reason."

"Thereupon Dr. Thomas obtained a mandamus from the circuit court for the county of Ingham requiring the board of supervisors to allow the bill, and the board has brought the matter to this court by certiorari."

"The circuit judge based his action upon the theory, as we understand his opinion, that the amendment of 1903 gives the board of supervisors no power to determine whether a debatable disease does or does not come within the statute; and that, the decision of the local board is yet final on that point."

*Samuel Hopkins Adams in McClure's.

"Hence, as we understand the record, the only questions on this appeal are:

"First, The power of the supervisors to make such determination; and

"Second, If they have the power, was their discretion legally exercised upon the evidence given in support of the claim."

"In our view of the case it will be necessary to pass upon only the first of these questions. The board of health gets its power to act in these cases from Sec. 4424 C. L. as amended by Act No. 7, Pub. Acts of 1903. The provisions contained in this section, previous to the amendment of 1903 have been frequently construed by this court. See *Safford v. Board of Health*, 110 Mich. 85; *village of St. Johns v. Board of Supervisors*, 111, id. 609; *Brown v. Board of Supervisors*, 126, id. 276; *Zimmerman v. Board of Supervisors*, 133, id. 494; *Cedar Creek Township v. Board of Supervisors*, 135, id. 124. These cases held that when the township board of health had acted, under the provisions of the section, its action was final and the duty of the board of supervisors was to so treat it."

In 1903 the section was amended. The portion of the amendment material here reads as follows:

"And the said board of supervisors shall as soon as may be proceed to audit the said bill, and if found that the expenses were necessarily incurred, the services actually and necessarily performed, and the amounts claimed for such expenses and services are severally just and reasonable under the circumstances, the said board of supervisors shall allow the same or such parts thereof as the majority of the members elect of said board shall deem just and reasonable and provide for their immediate payment by the said county, and in auditing such accounts, said several boards of supervisors shall have full power to examine into the merits of all claims presented to them in accordance with the provisions herein contained, and may subpoena witnesses and take any other measures necessary to arrive at the truth of the same."

It is urged that by reason of this amendment the board of supervisors may substitute its judgment in place of the judgment of the board of health as to whether in a given case a person had a dangerous communicable disease. We do not think such was the purpose or effect of the amendment. The matter of the public health has been the subject of legislation for a great many years. Boards of public health have been created, and large powers given to them when the emergency arises for their exercise. These powers were curtailed in some respects by the amendment which we have quoted but it is just as much the duty of the board of health to act in case of an emergency now as it was before the amendment. When the board of health has acted in cases where it is its duty to act and has filed the statement with the county clerk as provided by the statute it is the duty of the board of supervisors to proceed to audit the bill. The board of supervisors is not given the power to decide whether the disease with which the person was afflicted was a dangerous communicable one but it is its duty to in good faith determine whether the expenses charged in the itemized statement were necessarily incurred, and whether the services for which charges were made were actually and necessarily performed and whether the amounts claimed for such expenses and services are severally just and reasonable. If it is determined they are they should be allowed. The practical effect of a construction of the statute in harmony with the action of the board of supervisors in this instance would leave the board of health shorn of its powers. We do not think that was the purpose or effect of the amendment.

[Signed]

The Judgment is affirmed

JOSEPH B. MOORE,
CHAS. A. BLAIR,
R. M. MONTGOMERY,
CLAUDIUS B. GRANT,
AMON V. McALVAY.

Filed Dec. 15, 1905. 142 Mich. 319.

TABLE 41.—*Restrictive and preventive measures in typhoid fever, in Michigan, in 1905.*

Restrictive and preventive measures.	Number of cases.	Per cent of all cases.
PLACARDING OF PREMISES:		
Enforced.....	1,881	68
Neglected.....	539	19
ISOLATION OF SICK PERSONS:		
Enforced.....	2,020	73
Neglected.....	285	10
DISCHARGES FROM THE BOWELS AND BLADDER:		
Disinfected.....	1,937	70
Not disinfected.....	293	10
CLOTHING AND OTHER ARTICLES SOILED BY DISCHARGES:		
Disinfected.....	2,213	80
Not disinfected.....	59	2
INFECTED ROOMS:		
Disinfected.....	1,384	50
Not disinfected.....	698	25
DRINKING WATER:		
Boiled during the period of sickness.....	538	* 19
Not boiled.....	1,565	* 57
PROTECTION AGAINST FLIES:		
Houses screened.....	1,196	† 64
Not screened.....	212	† 11

*There were 232 cases definitely traced, or believed to have been due, to infected water in the localities where the patients resided, and in 32 per cent of these instances the boiling of the drinking water was carried out, and neglected in 57 per cent.

†Of the 2,774 cases of typhoid fever in 1905, 901 cases occurred in months when there were no flies, consequently no necessity for screening; therefore the 901 cases have not been used in figuring these per cents.

REPORT OF INVESTIGATION OF TYPHOID FEVER AT ALMA, MICHIGAN.

On June 15, 1905, Alma College gave a banquet to its students and other friends. Some two or three weeks later, reports came to this Department relative to typhoid fever in several localities throughout the State, and in tracing the source of infection, it developed that the persons afflicted attended this banquet.

At the request of Dr. Bruske, President of the College, also the health

board of Alma, and many others, the State Board of Health investigated this outbreak with a view of determining the cause of same. Secretary Shumway going to Alma for this purpose, the investigation disclosed the following facts. The sanitary condition of Alma and vicinity as regards water supply, drainage, sewerage, etc., is above the average for places of that size; especially is this true of the College and its surroundings. An analysis of the water supply made of a sample sent to the Laboratory of Hygiene at Ann Arbor, showed it to be free from germs or other impurities. The College stands on an elevation affording the best of drainage, light, and air; and a thorough inspection of the building and its appointments convinced this Board that the infection did not arise from any local cause, unless you might call the banquet a local cause.

Regarding the banquet, there was, of course, no opportunity to make a chemical or bacteriological analysis of what entered into the menu served, owing to the length of time that had elapsed. Therefore, it would be impossible to state what special part of the menu was accountable for the condition that developed. But we do feel justified in asserting that the typhoid infection was contained in some part of said menu.

Fourteen different localities were affected by this outbreak; twenty-three cases reported to this Department with five deaths. It is stated by the Press that over fifty cases of typhoid fever resulted from this exposure; and I am inclined to think that this number is conservative as in many instances the health officers will report the first case taken sick in a locality, and neglect to report those that follow.

SPECIAL INVESTIGATION RELATIVE TO EPIDEMIC OF TYPHOID FEVER IN R. G. PETERS' LUMBER CAMPS, WEXFORD COUNTY.

An investigation of the typhoid fever epidemic at R. G. Peters' camps in Wexford county, by Secretary Shumway of the State Health Department and Dr. Ralston, local health officer of Cadillac, disclosed a most insanitary condition surrounding said camps,—bunk house, cook and dining shanty, blacksmith shop, water supply, dumping trench, barn and manure heap, all within a radius of six or eight rods, the dumping trench being located above and not more than four rods from well and cook shanty. A number of deaths from typhoid fever having occurred the year previous in these camps, it was almost a self evident fact that the present epidemic was caused by the water supply; also by flies carrying the contagium from this dump trench to the food in the cook shanty, swarms of flies covering every article of food on the table at the time of the investigation.

Through cooperation on the part of the foreman of the camp, we were able to have the dump trench disinfected and filled up and another trench dug below the camp and away from the buildings, the bunk shanty thoroughly disinfected, the food screened, and a more sanitary condition of the entire camp effected. Results since have shown the wisdom of this course, as but scattering cases of this disease have appeared this past season.

A CAMPAIGN OF EDUCATION AGAINST TYPHOID FEVER IN GRAND RAPIDS.

The following statement, taken from the Grand Rapids Evening Press of January 31, 1905, is of great interest to this Department because the campaign of education therein outlined is in accordance with the plan instituted by this Department in 1895, of educating the children in our schools relative to the nature, methods of communication, and best measures for the re-

striction and prevention, of the dangerous communicable diseases. Through the knowledge thus acquired by the children it is believed that many of the parents are enlightened upon these questions, and it is certain that some of the seed thus sown in the youthful minds will remain, and bear fruit in later years when they shall take their places in the great battle of life. The health officials of the city of Grand Rapids are deserving of much commendation for this forward movement, and it is hoped that, in many other localities where typhoid fever or any other dangerous disease may be prevalent, the health officials of such localities will inaugurate similar measures for aiding in the restriction and prevention of the diseases and in the saving of human lives.

FIGHT ON TYPHOID.

Circular on Fever to Be Given to Each School Child.

A printed circular urging the necessity of boiling the drinking water throughout the city has been issued bearing the signature of the mayor and Dr. Koon, the health officer, and will be sent to all the public and parochial schools of this city for distribution among the pupils. The paper calls attention to the 661 cases of typhoid fever reported in the city last year and the sixty-one deaths resulting. It shows forcibly in a few words how the disease is spread through impure water and ends thus: "There will be no safety in drinking unboiled water until the city furnishes a pure supply. Boil the water."

This paper has been printed in English, Holland and Polish and is aimed to reach every family in the city if possible through the agency of the schools.

A DANGEROUS PRACTICE.

In the latter part of 1905, a letter was received from the health officer of a township in Calhoun county setting forth that a farmer was remodeling his house and putting in a bath room, and intended to discharge the sewage from the house into an old well and drive a new well for the water supply. Fearing contamination of their wells, neighbors of this man complained to the health officer and he, in turn, wrote to this Department for advice in the matter, which was given.

At the regular meeting of this Board, in April, 1893, Prof. Delos Fall called the special attention of the Board to a custom, in certain localities, of boring through an underlying basin of clay or rock for the purpose of getting rid of filthy contaminated water. Instances of such a practice were cited, and Prof. Fall was appointed a committee to investigate and report upon the subject at some future meeting. Prof. Fall's report* cited instances of the drainage by deep borings, of low places on farms on which water stood, and the contamination of the water in wells thereby, one of which was said to be two miles distant from the boring which caused the trouble.

The use of an old well for the disposal of house sewage would be considered more dangerous than the removal, by borings, of the water from low places on farms, because of the possibility of infection of the sewage and the underground water by the discharges of persons suffering from typhoid fever.

Under certain conditions, cesspools, as ordinarily constructed, would be equally as dangerous as the discharge of sewage into an old well. Thus,

*Printed on page li, of the Annual Report of this Department for 1893.

in a light or open subsoil, where the water bearing strata is not far below the surface of the ground, the leachings from a cesspool would undergo but little filtration in their passage to the underground water, and the effectiveness of the soil as a filtering medium would decrease as it became saturated by the almost constant flow of sewage.

During the year 1905, considerable correspondence was had, by this Department, with residents of the village of Tecumseh, relative to the danger from cesspools in that locality. It was stated that new cesspools were being constructed from time to time, and that the purity of the water supplies was threatened thereby. The interest which was awakened at that time resulted in a long communication, by the health officer, to the village council, which was printed in the local newspaper, and which ended with the following excellent recommendations:

- "1. The construction at the earliest practicable time of an adequate sewer system for our village.
- "2. Require sewer connections when this may be provided and where practicable.
- "3. To forbid the construction of cesspools or vaults of any form.
- "4. Forbid the use of vault closets and cesspools within the village.
- "5. Recommend or require the use of the dry earth closet until water carriage may be had by sewers.
- "6. Provide an adequate system of removal of the contents of dry earth closets, weekly or as often as may be needed.
- "7. Forbid the use of water for drinking or culinary purposes from any well within 100 feet of a cesspool or privy vault, without boiling thoroughly.
- "8. Warn the public of the danger of continued contamination of the soil from these sources."

It would be an excellent thing if the attention of the people in many other localities in the State, was called to the danger which may result from the use of cesspools and privy pits and vaults, and from the drinking of water from shallow wells in localities where such methods of disposing of excreta are in vogue.

In January, 1898, the attention of this Department was called to the growing practice, in certain localities, of constructing cesspools in close proximity to wells, and preambles and a resolution relative to this practice were adopted by the Board, and printed in the annual report of the Department for that year. As many localities are still disposing of their sewage in this manner, the republication of the views of the Board upon this question may be of service to the health officer, or a private citizen in some such locality in awakening or moulding public sentiment in favor of better methods of disposing of excreta.

PROPOSED PREAMBLES AND RESOLUTION RELATIVE TO CESSPOOLS.

WHEREAS, It has come to the notice of this Board that, in at least one city in this State, cesspools are being constructed and proposed to be constructed, in close proximity to wells the water from which is used for drinking purposes, such cesspools to receive sewage from water closets; and

WHEREAS, This Board considers such a practice a nuisance and dangerous to the public health, because this method starts a water-carriage system where there is no possibility of promptly completing the removal before decomposition occurs, but plans to store up fermenting human excreta, together with the great quantities of infected water, in receptacles which, though water-tight at first, must after a time overflow or leak, in which case, as they are in the earth, there is no probability of the detection of the leak; and, as they soon fill, their contents must, from time to time, be removed, at the risk of overflow, spilling, and the giving off of noxious odors; and

WHEREAS, Such a practice has been proved to be dangerous to the public health, as

for instance, in the city of Munich, where when the privy pits had their sides and bottoms cemented there was a reduction of the mortality from typhoid fever compared with when the bottoms were open, but a much greater mortality than after these were abolished and sewers and a general water-supply were supplied and used; therefore

Resolved, That this Board recommends to all local boards of health in cities and villages in Michigan where such practices occur or are proposed, that they make and publish under Sections 4412 and 4416 of the Compiled Laws of 1897, "regulations" which when published shall have the force of law, and which shall: (1) Forbid the construction or use of any cesspool, within one hundred feet of any well the water from which is used for drinking or culinary purposes, however such cesspool is constructed, which is to receive the contents of a water closet; (2) forbid the construction (or use?) of any privy vault within one hundred feet of any such well; (3) require, or at least recommend, the use of the dry-earth closet and frequent removal of its contents wherever there is not a public water-supply and complete water-carriage disposal of excreta through sewers; (4) recommend and as far as possible secure the extension of the water-supply and public sewers, wherever this extension is practicable, to all residences or buildings where otherwise there are wells endangered by privies or cesspools; and (5) forbid the use of cesspools and privy vaults wherever it is practicable to obtain sewer connection.

"WINTER CHOLERA."

During the severe epidemic of typhoid fever in Escanaba, which began in February, 1904, and continued into and through 1905, and to which extensive reference was made in the annual report of this Department for 1905, a number of the early cases of sickness were said to have "the form of 'Winter Cholera,' with some symptoms of typhoid fever," the sickness in some instances terminating fatally in four or five days. The term "Winter Cholera" is not recognized in the authoritative medical dictionaries, and yet it is often used to designate cases of sickness of a diarrheal nature occurring in the winter months. Judging from the reports of conditions at Escanaba at that time, there is good reason to believe that not only the cases of typhoid fever, but also the large number of cases of intestinal trouble of various kinds, were due to the water supply, and it would be interesting to know just to what extent the cases of bowel infection, not classed as typhoid fever, were due to typhoid infection. As indicating a probable connection between the cases of "Winter Cholera" and the water supply at Escanaba, the following extract from the report of the Indiana State Board of Health for 1901-1902 will be of interest:

"December 27 information was received by telephone from Michigan City that a severe epidemic of winter cholera existed at that place. My informant, Dr. Tillotson, said he believed the outbreak was due to sewage which had been introduced in the water supply. He explained that there were two intakes in the water works, one reaching about half a mile out into the lake and another a few hundred feet, opening into the creek. The latter intake was put in as a precaution against fire, because it was known that lake intakes sometimes freeze up. In the event of the freezing of the long intake, then water could be pumped from the creek. On the 21st of December, without any warning, the engineer at the water works turned in the water from the creek, and within twenty-four hours, hundreds of people were prostrated with severe diarrhea, attended with pain, and having many of the minor symptoms which reminded of cholera. It was for this reason that the disease was called winter cholera."

That the term "Winter Cholera" is not new is shown by the fact that at a meeting of this State Board of Health, in April, 1881, the Secretary presented a report relative to the prevalence of "Winter Cholera" in the southern portion of the State and in two State institutions, and a movement was started for the purpose of learning the nature of the disease.

DIPHTHERIA AND CROUP IN MICHIGAN IN 1905 AND PRECEDING YEARS.

GENERAL PREVALENCE.

Ending with the year 1904, the study of diphtheria by *outbreaks*, was discontinued, and beginning with the year 1905, the study of the disease was made by *households*.

During the year 1905, diphtheria was reported present in 523 households, with totals of 2,159 cases and 465 deaths, an average of 1.4 cases and .31 deaths per household.

In 1905, compared with the average for the eleven years, 1894-1904, the number of cases were 1,052 less, and the deaths 126 less.

By reference to Table 42 it may be seen that in the eleven years, 1894-1905, the average numbers of cases and deaths, the average deaths per 100 cases, and the average death rate per 100,000 of the population, were much less than the average in the ten preceding years. The reason for this decrease will be considered in connection with Table 41, on a subsequent page of this article.

Going back still further, by reference to Table 43, we find that in the 15 years, 1869-1883, the average death rate was about 58.5 per 100,000 of the population, a rate not equalled in any subsequent year. This high rate was due to the unusual rates for each of the years 1879-1882, the maximum of 145.2 deaths per 100,000 being reached in 1881. In the last year named, active measures for the restriction of diphtheria were begun by the State Department of Health, and the Tables 42 and 43 show a much lower death rate for each year since that time, especially in the last eleven years.

A comparison of the death rates from diphtheria in Michigan, in certain years, with the death rates from this disease in other states, groups of cities outside of Michigan, and foreign countries, is shown by the following extract from the Michigan Monthly Bulletin of Vital Statistics for September, 1905:

COMPARATIVE MORTALITY FROM DIPHTHERIA AND CROUP.*

For the census year 1900 the death rate in Michigan was lower than in any other registration state except Vermont, where the registration of deaths fell below the standard adopted by the census for that year: Connecticut, 35.9; District of Columbia, 75.4; Maine, 24.1; Massachusetts, 45.5; Michigan, 22.3; New Hampshire, 26.0; New Jersey, 48.8; New York, 45.3; Rhode Island, 29.6; Vermont, 18.3. Some foreign rates for the year 1902 from diphtheria and croup are: Norway, 10.8; German Empire, 32.2; Prussia, 40.2; Hungary, 46.1; Belgium, 26.3; Switzerland, 21.6; Spain, 28.0; and Italy, 13.7. Diphtheria alone gave the following: England and Wales, 23.6; Scotland, 14.6; Ireland, 9.5; New South Wales, 5.3; Victoria, 8.6; New Zealand, 6.8. Groups of American cities, according to the U. S. Census Bureau, gave for the eleven-year period 1890-1900 the following average rates from diphtheria and croup: Cities in New England states, 77; cities in Middle states, 101; cities in Lake states, 79; cities in Southern states, 54; cities in Western Central states, 61; San Francisco, Cal., 51. The mortality was greatly reduced during the period, so that the present average rate would be much less.

*Extracted from the Michigan Monthly Bulletin of Vital Statistics, September, 1905.

TABLE 42.—*The prevalence of diphtheria, in Michigan, during the ten years, 1884-1893, and before the use of antitoxin; also a similar statement for the twelve years, 1894-1905, since the beginning of the general use of antitoxin.*

Years.	Population. (Estimated for intercensal years.)	Reported cases.	Reported deaths.	Deaths per 100 cases.	Deaths per 100,000 of the population.
1884.....	1,853,658	3,915	905	23.1	48.8
1885.....	1,893,697	4,018	964	24.0	50.9
1886.....	1,933,735	4,244	982	23.1	50.8
1887.....	1,973,774	3,382	825	24.4	41.8
1888.....	2,013,812	2,228	532	23.9	26.4
1889.....	2,053,851	3,157	683	21.6	33.3
1890.....	2,093,889	4,206	1,050	25.0	50.1
1891.....	2,130,827	4,385	1,002	22.9	47.0
1892.....	2,167,765	4,818	1,099	22.8	50.7
1893.....	2,204,703	4,736	1,092	23.1	49.5
Averages 1884-1893.....	2,031,971	3,909	913	23.4	44.9
1894.....	2,241,641	3,852	744	19.3	33.2
1895.....	2,271,531	3,433	708	20.6	31.2
1896.....	2,301,421	4,013	757	18.9	32.9
1897.....	2,331,311	4,132	756	18.3	32.4
1898.....	2,361,201	2,357	477	20.2	20.2
1899.....	2,391,091	2,154	435	20.2	18.2
1900.....	2,420,982	2,706	528	19.5	21.8
1901.....	2,450,872	2,498	493	19.7	20.1
1902.....	2,475,499	2,993	500	* 16.4	20.2
1903.....	2,502,758	3,670	569	15.5	22.7
1904.....	2,530,016	3,510	538	15.3	21.3
1905.....	2,557,275	2,159	465	21.5	18.2
Averages 1894-1905.....	2,402,967	3,123	581	18.6	24.2

*Exclusive of the cases in the cities of Muskegon and Sault Ste. Marie, from which only the fatal cases were reported in this year.

TABLE 43.—*The numbers of deaths from diphtheria and croup, in Michigan, per 100,000 persons living, in each of the fifteen years, 1869–1883. Compiled from reports to the Secretary of State.*

Years.....	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
Deaths.....	17.0	20.9	22.5	28.2	29.6	26.2	26.9	34.7	50.6	72.8	110.5
Years.....	1880.	1881.	1882.	1883.	Average, 1869–1883.						
Deaths.....	113.9	145.2	102.1	75.7	58.5						

GEOGRAPHICAL DISTRIBUTION OF DIPHTHERIA.

Table 44 shows that, as indicated by the numbers of cases and deaths per 100,000 of the population in the fifteen years, 1891–1905, diphtheria was much more prevalent than the average for the entire State (145.5 cases and 28.8 deaths per 100,000) in the Southeastern and Bay and Eastern divisions.

The counties in which the case and death rates from diphtheria were unusually high in the fifteen years, 1891–1905, are:

Roscommon*.....	with rates of	659 cases and	179.7 deaths per	100,000.
Gogebic.....	" " "	293	" " 50.9	" " "
Midland.....	" " "	291	" " 42.6	" " "
Cheboygan.....	" " "	288	" " 52.3	" " "
Wayne.....	" " "	280	" " 62.8	" " "
Bay.....	" " "	278	" " 47.7	" " "
Arenac.....	" " "	239	" " 35.9	" " "
Marquette.....	" " "	237	" " 37.7	" " "
Alpena.....	" " "	231	" " 42.9	" " "
Otsego.....	" " "	228	" " 52.5	" " "
Huron.....	" " "	222	" " 44.4	" " "
Presque Isle.....	" " "	220	" " 64.6	" " "
Iosco.....	" " "	218	" " 43.6	" " "
Dickinson.....	" " "	216	" " 36.0	" " "

Following are nine counties in which either the case or death rate was unusually high during the same period:

Alcona.....	with rates of	144 cases and	53.8 deaths per	100,000.
Houghton.....	" " "	156	" " 25.4	" " "
Kalkaska.....	" " "	186	" " 31.0	" " "
Lake.....	" " "	145	" " 36.1	" " "
Menominee.....	" " "	176	" " 28.0	" " "
Monroe.....	" " "	172	" " 33.2	" " "
Muskegon.....	" " "	164	" " 29.5	" " "
Saginaw.....	" " "	167	" " 28.9	" " "
Shiawassee.....	" " "	242	" " 29.9	" " "

*The amazingly high rates in this county were due to a case of so-called "sore throat" in 1903, of which particulars were given in the annual report of this Department for 1894. The high rates in other counties were due, in the main, to epidemics in one or more of the fifteen years for which the rates are computed.

TABLE 44.—*The geographical distribution of diphtheria, in Michigan, in the fifteen years, 1891–1905, as indicated by the average numbers of cases and deaths, and the average deaths per 100,000 persons living, in each geographical division shown in the table.*

Geographical division.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
UPPER PENINSULA DIVISION.	236,784	372.4	66.2	28.0
Alger county.....	4,458	3	.6	13.5
Baraga county.....	4,607	.8	.1	2.2
Chippewa county.....	18,391	* 15	5	27.2
Delta county.....	22,461	19	4	17.9
Dickinson county.....	16,656	36	6	36.0
Gogebic county.....	15,707	46	8	50.9
Houghton county.....	55,206	86	14	25.4
Iron county.....	6,712	7	2	29.8
Keweenaw county.....	3,234	5	.9	27.8
Luce county.....	2,865	.6	.1	3.5
Mackinac county.....	7,599	3	.5	6.6
Marquette county.....	39,746	94	15	37.7
Menominee county.....	25,008	44	7	28.0
Ontonagon county.....	6,288	7	1	16.0
Schoolcraft county.....	7,846	6	2	25.5
NORTHWESTERN DIVISION.	82,547	77	14.9	18.1
Benzie county.....	9,307	8	.9	9.7
Grand Traverse county.....	19,896	19	4	20.1
Leelanau county.....	10,157	11	2	19.7
Manistee county.....	27,062	23	5	18.5
Wexford county.....	16,125	16	3	18.6
NORTHERN DIVISION.	71,139	87	17.6	24.7
Antrim county.....	14,160	5	2	14.1
Charlevoix county.....	13,010	5	1	7.7
Cheboygan county.....	15,282	44	8	52.3
Crawford county.....	3,038	3	.7	23.0
Emmet county.....	13,490	5	.9	6.7
Kalkaska county.....	6,448	12	2	31.0
Otsego county.....	5,711	13	3	52.5
NORTHEASTERN DIVISION.	85,990	120	26.2	30.5
Alcona county.....	5,572	8	3	53.8
Alpena county.....	18,655	43	8	42.9
Iosco county.....	11,455	25	5	43.6
Montmorency county.....	33,865	21	4	11.8
Ogemaw county.....	6,907	5	.9	13.0
Oscoda county.....	1,795	1	.3	16.7
Presque Isle county.....	7,741	17	5	64.6
WESTERN DIVISION.	267,256	330	66	24.7
Kent county.....	129,176	183	37	28.6
Lake county.....	5,536	8	2	36.1
Mason county.....	19,118	19	4	20.9
Muskegon county.....	37,293	* 61	11	29.5
Newaygo county.....	18,712	8	2	10.7
Oceana county.....	17,055	10	2	11.7
Ottawa county.....	40,366	41	8	19.8
NORTHERN CENTRAL DIVISION.	99,810	108	21.2	21.2
Clare county.....	8,446	10	2	23.7
Gladwin county.....	6,206	2	.2	3.2
Isabella county.....	22,706	17	3	13.2
Mecosta county.....	20,813	11	3	14.4
Midland county.....	14,087	41	6	42.6
Missaukee county.....	8,397	5	1	11.9
Oscoda county.....	17,486	11	3	17.2
Roscommon county.....	1,669	11	3	179.7

*Only the fatal cases were reported from the cities of Muskegon and Sault Ste. Marie, in 1892.

TABLE 44.—CONCLUDED.

Geographical division.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
BAY AND EASTERN DIVISION.	341,157	600	108	31.7
Arenac county.....	8,366	20	3	35.9
Bay county.....	62,915	175	30	47.7
Huron county.....	33,754	75	15	44.4
Lapeer county.....	28,184	34	6	21.3
Saginaw county.....	83,130	139	24	28.9
Sanilac county.....	34,603	46	10	28.9
St. Clair county.....	54,858	78	16	29.2
Tuscola county.....	35,347	33	4	11.3
CENTRAL DIVISION.	314,844	307	53	16.8
Barry county.....	23,064	17	3	13.0
Clinton county.....	25,773	19	4	15.5
Eaton county.....	32,067	20	4	12.5
Genesee county.....	41,407	38	7	16.9
Griatiot county.....	29,523	14	3	10.2
Ingham county.....	40,970	59	10	24.4
Ionia county.....	34,879	19	5	14.3
Livingston county.....	19,804	19	3	15.1
Montcalm county.....	33,865	21	4	11.8
Shiawassee county.....	33,487	51	10	29.9
SOUTHWESTERN DIVISION.	140,006	103	26	18.5
Allegan county.....	39,118	24	7	17.9
Berrien county.....	47,628	48	11	23.1
Cass county.....	20,846	14	3	14.4
Van Buren county.....	32,414	17	5	15.4
SOUTHERN CENTRAL DIVISION.	315,992	270	46	14.6
Branch county.....	26,414	17	5	18.9
Calhoun county.....	49,619	57	9	18.1
Hillsdale county.....	30,022	27	3	10.0
Jackson county.....	47,078	38	10	21.2
Kalamazoo county.....	44,698	59	6	13.4
Lenawee county.....	48,671	35	7	14.4
St. Joseph county.....	24,390	10	1	4.1
Washtenaw county.....	45,100	27	5	11.1
SOUTHEASTERN DIVISION.	439,615	1,064	236	53.7
Macomb county.....	32,754	49	11	33.6
Monroe county.....	33,111	57	11	33.2
Oakland county.....	43,898	36	7	15.9
Wayne county.....	329,852	922	207	62.8

*Only the fatal cases were reported from the cities of Muskegon and Sault Ste. Marie, in 1892.

THE PREVALENCE OF DIPHTHERIA IN URBAN AND RURAL LOCALITIES IN 1905.

Table 45 indicates that, with the exception of one group (cities and villages under 5,000), diphtheria was most prevalent in the large centers of population, and least prevalent in the rural localities (principally townships).

The status of diphtheria in groups of localities in Michigan, in the five years, ending in 1904, is shown by the following extracts from the Michigan Monthly Bulletin of Vital Statistics for September, 1905, but the rates for groups of localities of less than 5,000 population will not be comparable with the rates for corresponding groups in Table 38, because, in the Bulletin article, only cities are included in the group of localities having populations of less than 5,000, while in the Table both cities and villages are included in this group:

MORTALITY FROM DIPHTHERIA AND CROUP IN MICHIGAN FOR FIVE YEARS, 1900-04.*

Cities, grouped according to population at State census of 1904.	Deaths per 100,000 of the population.					
	1904.	1903.	1902.	1901.	1900.	Average.
Cities over 50,000.....	37.7	60.3	36.9	20.1	28.1	36.9
Cities from 25,000 to 50,000.....	21.6	15.0	17.7	20.5	33.5	21.5
Cities from 10,000 to 25,000.....	19.2	43.0	38.2	22.9	36.8	32.0
Cities from 5,000 to 10,000.....	17.4	30.3	12.8	29.5	19.3	21.9
Cities under 5,000.....	13.0	12.4	16.8	27.4	20.9	18.0
Total urban population.....	26.0	41.2	29.6	22.8	29.0	29.8
Total rural population.....	16.3	18.1	13.9	18.7	17.6	16.9

* * * * *

The average death rate from diphtheria and croup in Detroit, 42.2, is more than twice as great as that of Grand Rapids, 19.4, directly opposite to the incidence of typhoid fever in the two cities. Recent years have apparently shown increased prevalence in Detroit, the highest rate being 72.7 in 1903. Bay City had the highest rate in the group following, 35.5 for the period, and the maximum was in 1900 with 72.4. West Bay City, now consolidated with Bay City, has a slightly higher average rate than the latter. Jackson has the lowest average rate, 11.9, of any city over 25,000 population, but Kalamazoo is a close second with a rate of 14.0.

Among cities of 10,000 to 25,000 population, the highest rate, as well as the highest rate for any city in the State, occurs in the city of Ironwood. The rate was 89.2 per 100,000 for the five-year period, the greatest prevalence being in 1903, 150.9, and 1902, 131.8. Next to Ironwood in this group come Ishpeming, 65.9, and Sault Ste. Marie, 58.2, while Traverse City, 9.7, Ann Arbor, 12.4, and Muskegon, 13.4, showed the lowest average rates.

Cities of from 5,000 to 10,000 population show lower rates than those of larger size as a rule, but the average rate for Wyandotte, 67.9, is second highest in the State. The greatest mortality for this city was in 1903, 167.8, which exceeded that of any other city. * * * * * Next to Wyandotte in this group the highest rate occurs in Negaunee, 49.5, and the lowest rates are in Holland, 7.2, Ionia, 7.7, and Grand Haven, 8.0.

Local sanitary officials should be able, by the aid of these tables, to see how the mortality from diphtheria in their districts compares with that of cities of similar size and with that of the State generally. It would seem that there has not been that continuous and progressive diminution of the disease that should result from prompt reports of its occurrence to the sanitary officials and the general and thorough use of antitoxin, now accepted as the specific curative agent in the treatment of the affection. It is possible that sanitary measures may have counteracted one of the natural increases in prevalence indicated by the increase in 1900, and that the comparatively slight incidence of the disease since that date may represent a real triumph of sanitation. Even if this be so, there is no reason why efforts should not be made for its complete extermination, and it is to be hoped that the next quinquennial comparison will show much less than five hundred lives sacrificed each year in Michigan to this entirely preventable disease.

*Extracted from the Michigan Monthly Bulletin of Vital Statistics for September, 1905.

TABLE 45.—*The prevalence of diphtheria in urban and rural localities, in Michigan, in 1905.*

Localities.—Grouped according to density of population.	Estimated population.	Health jurisdictions.			Cases*.	Deaths.	Death rates per 100,000 of the population.
		Total.	Infected.				
			Number.	Per cent of all jurisdictions.			
Cities over 50,000.....	423,319	2	2	100	446	151	35.7
Cities from 25,000 to 50,000.....	144,748	4	4	100	280	41	28.3
Cities from 10,000 to 25,000 and Calumet township (17,518).....	257,506	18	16	89	217	49	19.0
Cities and villages from 5,000 to 10,000†.....	147,649	23	19	83	167	30	20.3
Cities and villages under 5,000†.....	375,013	364	83	23	208	40	10.7
Total urban.....	1,348,325	411	124	30	1,318	311	23.1
Balance of localities—principally townships‡.....	1,208,950	1,229	253	21	841	154	12.7

*This footnote is below Table 42, on a preceding page.

†Exclusive of twenty-seven villages in the two groups, for which the population in 1905 cannot be correctly estimated.

‡Includes the twenty-seven villages mentioned in the preceding paragraph, but does not include Calumet township, which, for the purpose of this study, is included in the third group of urban localities, which have corresponding populations.

THE SEASONAL PREVALENCE OF DIPHTHERIA.

Table 46 indicates that diphtheria is most prevalent during the cold weather, reaching its maximum prevalence in the month of November. It is least prevalent in the Spring and Summer months, the minimum occurring in July.

TABLE 46.—*The seasonal prevalence of diphtheria, in Michigan, as indicated by the average number of persons taken sick with this disease in each month, during the nine years, 1897–1905.*

Months.....	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Average numbers of persons taken sick.....	301	184	166	140	153	154	118	128	202	362	370	330

REPORTED SOURCES OF CONTAGIUM IN DIPHTHERIA.

Table 47 indicates that, in the fifteen years, 1891-1905, but 21 per cent of the reports relative to diphtheria gave a definite source of contagium. Of this number, 75 per cent gave the source as "Traced to a former case," and 11 per cent as "Traced to outside jurisdictions."

Table 48 shows the places from which and to which diphtheria was spread in 1905.

TABLE 47.—*The reported sources of contagium in diphtheria, in Michigan, during the fifteen years, 1891-1905.*

Reported sources of contagium.	Number of instances.	Per cent of all cases.
Traced to a former case.....	8,200	15.9
Outside jurisdiction.....	1,221	2.4
Insanitary conditions.....	878	1.7
Probably traced to a former case*.....	340	.7
Infected premises, articles of clothing, etc.....	114	.2
Cases attributed to meteorological conditions.....	62	.1
At school.....	46	Too
Contaminated water.....	32	small
Infected by animals.....	5	to
From colds following measles.....	5	be
Attending funerals of diphtheria decedents.....	2	considered.

*Includes, principally, cases reported as traced to "sore throat," "croup," "tonsillitis," etc.

TABLE 48.—*Localities from which and to which diphtheria was spread, during the year 1905.*

Spread from:	To:	Spread from:	To:
Antrim County, Bellaire Village.	Grand Traverse County, Traverse City.	Jackson County, Jackson City.	Lenawee County, Woodstock Township.
Bay County, Bay City.	Ogemaw County, West Branch City.	Kalamazoo County, Kalamazoo City.	Calhoun County, Bedford Township.
Bay County, Pineconning Village.	Bay County, Kawkawlin Township.	Kalamazoo County, Kalamazoo City.	Kalamazoo County, Kalamazoo Township.
Benzie County, Thompsonville Village.	Antrim County, Elk Rapids Village.	Kent County, Alpine Township.	Ottawa County, Wright Township.
Calhoun County, Battle Creek City.	Calhoun County, Battle Creek Township.	Kent County, Grand Rapids City.	Eaton County, Roxand Township.
Calhoun County, Battle Creek City.	Calhoun County, Emmet Township.	Kent County, Grand Rapids City.	Ionia County, Danby Township.
Calhoun County, Marshall City.	Washtenaw County, Ann Arbor City.	Kent County, Grand Rapids City.	Jackson County, Hanover Township.
Delta County, Nahma Township.	Delta County, Garden Village.	Kent County, Grand Rapids City.	Kent County, Caledonia Township.
Dickinson County, Norway Township.	Dickinson County, Norway City.	Kent County, Grand Rapids City.	Kent County, Cascade Township.
Gogebie County, Ironwood City.	Gogebie County, Bessemer City.	Kent County, Grand Rapids City.	Kent County, Plainfield Township.
Grand Traverse County, (Locality not given.)	Benzie County, Homestead Township.	Kent County, Grand Rapids City.	Kent County, Walker Township.
Houghton County, Calumet Township.	Keweenaw County, Allouez Township.	Kent County, Grand Rapids City.	Muskegon County, Muskegon City.
Ingham County, Lansing City.	Shiawassee County, Woodhull Township.	Kent County, Grand Rapids City.	Ottawa County, Jamestown Township.
Jackson County, Jackson City.	Clinton County, Bath Township.	Kent County, Grand Rapids City.	Ottawa County, Tallmadge Township.
Jackson County, Jackson City.	Ingham County, Leroy Township.	Kent County, Sand Lake Village.	Montcalm County, Pierson Township.
Jackson County, Jackson City.	Jackson County, Spring Arbor Township.	Lenawee County, Adrian City.	Lenawee County, Fairfield Township.

TABLE 48.—CONTINUED.

Spread from:	To:	Spread from:	To:
Lenawee County, Adrian City.	Lenawee County, Rome Township.	St. Clair County, Port Huron City.	St. Clair County, Grant Township.
Lenawee County, Clayton Village.	Oseola County, Orient Township.	Washtenaw County, Ypsilanti City.	Washtenaw County, Ypsilanti Township.
Lenawee County, Tecumseh Village.	Wayne County, Glenwood Village.	Wayne County, Dearborn Village.	Wayne County, Springwells Township.
Livingston County, Conway Township.	Ingham County, Leroy Township.	Wayne County, Detroit City.	Monroe County, Berlin Township.
Mason County, Ludington City.	Mason County, Amber Township.	Wayne County, Detroit City.	Oakland County, Rochester Village.
Mason County, Riverton Township.	Mason County, Eden Township.	Wayne County, Detroit City.	Oakland County, Troy Township.
Mason County, Riverton Township.	Oceana County, Weare Township.	Wayne County, Detroit City.	Wayne County, Springwells Township.
Mason County, Sherman Township.	Mason County, Sheridan Township.	Wayne County, Wyandotte City.	Ingham County, Onondaga Township.
Menominee County, Menominee City.	Delta County, Baldwin Township.	Wexford County, Antioch Township.	Wexford County, Cadillac City.
Missaukee County, Lake City Village.	Missaukee County, Lake Township.	Wexford County, Boon Township.	Manistee County, Bear Lake Township.
Monroe County, Ida Township.	Monroe County, Raisinville Township.	FROM OUTSIDE THE STATE TO LOCALITIES IN MICHIGAN:	
Monroe County, Monroe City.	Monroe County, Frenchtown Township.		
Oakland County, Rochester Village.	Wayne County, Springwells Township.	Spread from:	To:
Saginaw County, Saginaw City.	Saginaw County, Blumfield Township.	California, San Francisco.	Emmet County, Petoskey City.
Shiawassee County, (Locality not given).	Genesee County, Flushing Township.	Illinois, Chicago.	Berrien County, Benton Harbor City.
Shiawassee County, New Haven Township.	Shiawassee County, Caledonia Township.	Illinois, Chicago.	Calhoun County, Battle Creek City.

TABLE 48.—CONCLUDED.

Spread from:	To:	Spread from:	To:
Illinois, Chicago.	Kent County, Grand Rapids City.	Iowa, (Locality not given).	Emmet County, Petoskey City.
Illinois, Chicago.	Leelanau County, Leland Township.	New York, Buffalo.	Allegan County, Saugatuek Village.
Illinois, Chicago.	Muskegon County, Muskegon City.	Ohio, Toledo.	Monroe County, La Salle Township.
Illinois, Chicago.	St. Clair County, Port Huron City.	Pennsylvania, Pittsburg.	Macomb County, Mt. Clemens City.

INFLUENCE OF AGE AND SEX, AND DURATION OF SICKNESS IN DIPHTHERIA.

In this report, the usual tables relative to the influence of age and sex, and the duration of sickness, in diphtheria, are omitted, having been discontinued with the annual report for 1905. Summaries of an eleven year's study of these phases of the disease may be found in the annual report for that year.

RESTRICTIVE AND PREVENTIVE MEASURES IN DIPHTHERIA.

By Table 49, it may be seen that, in 1905, the fatality from diphtheria in those *households* in which the antitoxin treatment was used was sixty-eight per cent less than in those households where it was not used, while in 1904, the difference in the fatality in *outbreaks* in which antitoxin was and was not used was but a little more than twenty-one per cent. It is believed that the remarkable showing in 1905 has been made possible by the change in the method of studying this disease by *households*, rather than by outbreaks.

The *immunizing* properties of antitoxin is strikingly shown by the following: In 1902, in addition to the sick persons treated with antitoxin, there were 495 persons more or less exposed to diphtheria who were treated with antitoxin, and of this number only 16 persons were reported to have contracted the disease. In 1903, 585 exposed persons were so treated and but 12 cases of diphtheria resulted among them. In 1904, 612 exposed persons were treated, and of this number 24 cases of diphtheria were reported. In 1905, 1,312 exposed persons were treated with antitoxin and of this number only 50 were taken sick with the disease. For the four years, 1902-1905, a total of 3,004 exposed persons were treated with antitoxin, and of these but 102, or about 3 per cent, were reported to have had the disease, in many instances in a very mild form.

By reference to Table 50, it may be seen that the restrictive and preventive measures (placarding, isolation and disinfection) were enforced in 679 households, or 45 per cent of the whole number of households, and that in 272 households, or 18 per cent of the whole number, the restrictive and preventive measures were not attempted. It may also be seen that in 1,212 households, the disease was restricted to the first case, and that in 64 households more than one case of diphtheria occurred, indicating a lack of or insufficient measures for the restriction and prevention of the disease.

TABLE 49.—*The antitoxin treatment of persons sick from diphtheria, in Michigan, in 1905.*

	Number of households.	Number of cases.	Number of deaths.	Deaths per 100 cases.
All outbreaks of diphtheria.....	1,523	2,159	465	21.5
Outbreaks in which antitoxin was used*.....	974	† 1,367	164	12.0
Outbreaks in which antitoxin was not used.....	549	792	301	38.0

*There were also 23 households, in which 27 deaths occurred, and in which 42 cases were treated with antitoxin, but as only a portion of the cases in these households were so treated, and there was nothing in the reports to show how many of the 27 fatal cases were included in the 42 cases treated, the 23 households are not included in this table.

†These figures represent the number of sick persons treated with antitoxin.

TABLE 50.—*Restrictive and preventive measures in diphtheria, in Michigan, in 1905.*

Number of households in which placarding, isolation and disinfection were....	<div> <div>Enforced.....</div> <div>Neglected.....</div> </div>	<div> <div>679</div> <div>272</div> </div>
Number of households in which the disease was restricted to the first case.....		1,212
Number of households in which more than one case of diphtheria occurred.....		64
Number of exposed persons treated with antitoxin.....		1,312
Number of exposed persons treated with antitoxin who afterwards had diphtheria.....		50
Number of households in which the exposed persons not treated with antitoxin were isolated during the incubation period..		583

SPECIAL INVESTIGATION RELATIVE TO DIPHTHERIA IN GRAND RAPIDS.

On November 28, 1905, Secretary Shumway was called to Grand Rapids to make investigation relative to the unusual prevalence of diphtheria in that city, and, in company with Dr. T. M. Koon, health officer of the city, went into the matter very thoroughly, particularly in so far as it affected the public school interests.

About this time, the medical inspection of schools in that city was inaugurated, and the diphtheria epidemic was controlled, it is believed, largely as the result of this inspection.

WHOOPIING-COUGH IN MICHIGAN IN 1905 AND PRECEDING YEARS.

GENERAL PREVALENCE.

During the year ending December 31, 1905, there were reported to the State Department of Health 150 outbreaks of whooping-cough, in 133 localities in Michigan, which resulted in 1,196 cases, including 119 deaths.

Table 51 shows that in 1905, compared with the preceding year, the numbers of cases and deaths were considerably less, and the death rate slightly less.

In 1905, compared with the average for the nineteen years, 1886-1904, the number of cases was 66 per cent less, the deaths 7 per cent less, and

the death rate per 100,000 inhabitants slightly less. The fatality rate (deaths per 100 cases) was considerably greater than the average, and greater than the fatality rate of any year shown in the Table.

In studying the fatality rates for whooping-cough, particularly in recent years, the fact should be borne in mind that prior to 1898, not all the deaths were reported, and that while the deaths from whooping-cough are now fully reported, a large number of cases are not reported, making the fatality in recent years much too high.

Table 52 gives the death rates for whooping-cough, as compiled by the Secretary of State, prior to the commencement of the compilation of this disease by the State Health Department. Comparing the death rates prior to 1886 with those since that time, it will be seen that, as a rule, the former were much greater, probably due to the different methods in use in the two departments in the classification of deaths from whooping-cough when complicated with or followed by other diseases induced by it.

TABLE 51.—*The general prevalence of whooping-cough, in Michigan, during the twenty years, 1886-1905.*

Years.	Population. (Estimated for intercensal years.)	Reported cases.*	Reported deaths.	Deaths per 100 cases.†	Deaths per 100,000 of the population.
1886.....	1,933,735	2,642	62	2.3	3.2
1887.....	1,973,774	2,267	59	2.6	3.0
1888.....	2,013,812	2,502	49	2.0	2.4
1889.....	2,053,851	2,694	41	1.5	2.0
1890.....	2,093,889	983	20	2.0	1.0
1891.....	2,130,827	2,360	101	4.3	4.7
1892.....	2,167,765	3,188	77	2.4	3.6
1893.....	2,204,703	4,047	134	3.3	6.1
1894.....	2,241,641	4,555	123	2.7	5.5
1895.....	2,271,531	4,284	109	2.5	4.8
1896.....	2,301,421	5,466	91	1.7	4.0
1897.....	2,331,311	3,978	72	1.8	3.1
1898.....	2,361,201	5,300	267	5.0	11.3
1899.....	2,391,091	6,509	216	3.3	9.0
1900.....	2,420,982	3,397	177	5.2	7.3
1901.....	2,450,872	2,955	118	4.0	4.8
1902.....	2,475,499	3,534	222	6.3	8.9
1903.....	2,502,758	4,172	361	8.7	14.4
1904.....	2,530,016	1,779	141	7.9	5.6
1905.....	2,557,275	1,196	119	9.9	4.7
Averages per year.....	2,270,398	3,390	128	3.8	5.6

*From Detroit, Bay City, Jackson and Alpena, and probably other localities, only the fatal cases were reported during many of the years.

†For the reason that, in many instances, only the fatal cases were reported, these fatality rates are probably inaccurate.

TABLE 52.—*The numbers of deaths from whooping-cough, in Michigan, per 100,000 persons living, in each of the seventeen years, 1869-1885. Compiled from the Secretary of State's Vital Statistics of Michigan.*

Years.....	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
Deaths.....	13.9	10.1	5.5	15.1	15.6	11.2	7.2	12.4	8.7	8.5	10.2
Years.....	1880.	1881.	1882.	1883.	1884.	1885.	Average, 1869-1885.				
Deaths.....	16.1	8.4	5.0	5.2	8.8	7.4	10.0				

GEOGRAPHICAL DISTRIBUTION OF WHOOPING-COUGH.

Table 53 indicates that in the eight years, 1898-1905, compared with the average death rate for the entire State for the same period (8.2 deaths per 100,000), whooping-cough was much more prevalent than the average in the Upper Peninsular Division, and slightly more prevalent than the average in the Northern, Northeastern and Bay and Eastern divisions.

The counties in which whooping-cough was unusually prevalent during the eight years, 1898-1905, placed in the order of apparent greatest prevalence, are: Alger, Iron, Arenac, Houghton, Menominee, Roscommon, Cheboygan, Marquette, Delta, Bay, Alpena, Otsego, Midland, Montcalm, Sanilac, Dickinson, Mason, Berrien and Gratiot.

TABLE 53.—*The geographical distribution of whooping-cough, in Michigan, in the eight years, 1898-1905, as indicated by the average numbers of cases and deaths, and the average deaths per 100,000 persons living, in each geographical division shown in the table.*

Geographical division.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
UPPER PENINSULAR DIVISION.				
	297,130	785	40.8	13.7
Alger county.....	6,002	9	2	33.3
Baraga county.....	40,015	1	.6	1.5
Chippewa county.....	21,132	126	2	9.5
Delta county.....	25,310	90	4	15.8
Dickinson county.....	17,793	22	2	11.2
Gogebic county.....	16,594	33	1	6.0
Houghton county.....	65,201	193	13	19.9
Iron county.....	8,728	18	2	22.9
Keweenaw county.....	3,674	3	0	.....
Luce county.....	3,216	4	.3	9.3
Mackinac county.....	7,675	7	.4	5.2
Marquette county.....	40,398	158	7	17.3
Menominee county.....	26,286	43	5	19.0
Ontonagon county.....	6,693	9	.6	9.0
Schoolcraft county.....	8,413	69	.9	10.7
NORTHWESTERN DIVISION.				
	89,278	95	5.9	6.6
Benzie county.....	10,592	6	.4	3.8
Grand Traverse county.....	22,185	37	2	9.0
Leelanau county.....	10,835	3	1	9.2
Manistee county.....	27,630	38	2	7.2
Wexford county.....	18,036	11	.5	2.8
NORTHERN DIVISION.				
	79,731	136	7.9	9.9
Antrim county.....	15,671	37	1	6.4
Charlevoix county.....	14,699	8	1	6.8
Cheboygan county.....	16,466	19	3	18.2
Crawford county.....	3,234	5	.3	9.3
Emmet county.....	16,068	35	1	6.2
Kalkaska county.....	7,118	12	.6	8.4
Otsego county.....	6,475	20	1	15.4
NORTHEASTERN DIVISION.				
	57,553	97	5.3	9.2
Alcona county.....	5,622	2	.1	1.8
Alpena county.....	19,421	23	3	15.4
Iosco county.....	10,096	12	1	9.9
Montmorency county.....	3,434	17	.1	2.9
Ogemaw county.....	7,884	38	.6	7.6
Oscoda county.....	1,697	3	0	.....
Presque Isle county.....	9,390	2	.5	5.3
WESTERN DIVISION.				
	273,647	264	15.8	5.8
Kent county.....	135,263	144	6	4.4
Lake county.....	5,041	7	0	.....
Mason county.....	19,681	28	2	10.2
Muskegon county.....	36,510	20	3	8.2
Newaygo county.....	18,007	12	.9	5.0
Oceana county.....	17,389	27	.9	5.2
Ottawa county.....	41,756	26	3	7.2
NORTHERN CENTRAL DIVISION.				
	105,265	239	7.7	7.3
Clare county.....	8,770	24	.6	6.8
Gladwin county.....	7,298	21	.5	6.9
Isabella county.....	23,814	35	2	8.4
Macomb county.....	20,769	38	1	4.8
Midland county.....	14,947	78	2	13.4
Missaukee county.....	9,649	11	.5	5.2
Oscoda county.....	18,395	26	.8	4.3
Rosecommon county.....	1,623	6	.3	18.5

*This footnote is below Table 51, on a preceding page.

TABLE 53.—CONCLUDED.

Geographical division.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
BAY AND EASTERN DIVISION.	346,120	415	31	9.0
Arenac county.....	9,626	11	2	20.8
Bay county.....	63,987	69	10	15.6
Huron county.....	35,096	82	3	8.5
Lapeer county.....	27,592	46	2	7.2
Saginaw county.....	83,344	49	5	6.0
Sanilac county.....	35,071	70	4	11.4
St. Clair county.....	55,315	45	3	5.4
Tuscola county.....	36,089	43	2	5.5
CENTRAL DIVISION.	316,137	676	23.8	7.5
Barry county.....	22,557	97	2	8.9
Clinton county.....	25,382	33	2	7.9
Eaton county.....	31,602	184	2	6.3
Genesee county.....	42,252	30	3	7.1
Gratiot county.....	29,945	23	3	10.0
Ingham county.....	42,131	55	2	4.7
Ionia county.....	35,160	97	2	5.7
Livingston county.....	19,263	57	.8	4.2
Montcalm county.....	33,770	52	4	11.8
Shiawassee county.....	34,075	48	3	8.8
SOUTHWESTERN DIVISION.	142,922	197	11	7.7
Allegan county.....	39,034	37	2	5.1
Berrien county.....	49,612	73	5	10.1
Cass county.....	20,617	35	1	4.9
Van Buren county.....	33,659	52	3	8.9
SOUTHERN CENTRAL DIVISION.	322,096	475	18.7	5.8
Branch county.....	26,583	40	2	7.5
Calhoun county.....	51,681	95	4	7.7
Hillsdale county.....	29,845	62	.8	2.7
Jackson county.....	47,708	98	4	8.4
Kalamazoo county.....	47,085	55	3	6.4
Lenawee county.....	48,790	52	3	6.1
St. Joseph county.....	23,803	28	.9	3.8
Washtenaw county.....	46,601	45	1	2.1
SOUTHEASTERN DIVISION.	473,892	230	38	8.0
Macomb county.....	33,122	46	3	9.1
Monroe county.....	33,177	58	2	6.0
Oakland county.....	45,113	34	2	4.4
Wayne county.....	362,480	92	31	8.6

*This footnote is below Table 51, on a preceding page.

THE REPORTED SOURCES OF CONTAGIUM IN WHOOPING-COUGH.

By Table 54 it may be seen that of the total number of reports of whooping-cough to the State Health Department, during the ten years, 1896-1905, but 20 per cent gave a definite source of contagium.

Of the cases in which a definite source of contagium was reported, 72 per cent were traced to a former case, and 27 per cent were traced to outside jurisdictions.

The places from which and to which whooping-cough was spread in 1905 are shown in Table 55.

TABLE 54.—*The reported sources of contagium in whooping-cough in Michigan, in the ten years, 1896-1905.*

Reported sources of contagium.	Number of cases.	Per cent of all cases.
Traced to a former case*.....	5,510	14
Traced to outside jurisdictions.....	2,036	5
Contracted in school.....	81	.2
Total number of cases in the ten years, 1896-1905.....	38,286	.....

*Many other cases which were traced to former cases are included with the cases reported as traced to outside jurisdictions.

TABLE 55.—*Localities from which and to which whooping-cough was spread, during the year 1905.*

Spread from:	To:	Spread from:	To:
Calhoun County, Albion City.	Calhoun County, Albion Township.	Montmorency County, Vienna Township.	Montmorency County, Avery Township.
Charlevoix County, Boyer City Village.	Charlevoix County, Hudson Township.	Oceana County, Clay Banks Township.	Oceana County, Shelby Village.
Ingham County, Leslie Village.	Calhoun County, Marengo Township.	Ottawa County, Tallmage Township.	Ottawa County, Robinson Township.
Ionia County, Ionia City.	Ionia County, Ronald Township.	St. Clair County, Clyde Township.	St. Clair County, Grant Township.
Jackson County, Jackson City.	Jackson County, Leoni Township.	FROM OUTSIDE THE STATE TO LOCALITIES IN MICHIGAN.	
Kalamazoo County, Cornstock Township.	Kalamazoo County, Alamo Township.	Spread from:	To:
Lenawee County, Rome Township.	Lenawee County, Adrian Township.	Finland, (Europe).	Marquette County, Republic Township.
Lenawee County, Woodstock Township.	Jackson County, Concord Township.	Illinois, Chicago.	Berrien County, Benton Township.
Lenawee County, Woodstock Township.	Jackson County, Concord Village.	Indiana, Elkhart.	Branch County, Coldwater City.
Mecosta County, Millbrook Township.	Mecosta County, Martiny Township.	Minnesota, Duluth.	Baraga County, Covington Township.
Montcalm County, Lakeview Village.	Ionia County, Ionia City.	Ohio, Cleveland.	Macomb County, Memphis Village.
		Ontario, (Locality not given).	Chippewa County, Rudyard Township.

PERIODS OF INCUBATION, INFLUENCE OF AGE AND SEX, AND SEASONAL PREVALENCE.

By reason of the very small number of cases of whooping-cough which are reported to the health officers of the several localities, and by them to this Department, statistics based upon these reports relative to the periods of incubation, influence of age and sex, and seasonal prevalence, in outbreaks of this disease, are not considered of sufficient value to warrant their compilation and publication year after year, and are therefore left out of this report. The summaries of past studies of these phases of the disease were printed in the annual report of this Department for 1905.

RESTRICTIVE AND PREVENTIVE MEASURES IN WHOOPING-COUGH.

Table 56 indicates that in 1904 and 1905, measures for the restriction and prevention of whooping-cough were enforced in but four per cent of the outbreaks, and that in fifteen per cent of the outbreaks no attempt was made to restrict the disease.

TABLE 56.—*Isolation of sick persons, and disinfection of infected premises and contents, in outbreaks of whooping-cough, in Michigan, in 1904 and 1905.*

Isolation and disinfection.	Number of outbreaks.	Per cent of all outbreaks.
Both enforced.....	13	3.8
Both neglected.....	51	15.1

SCARLET FEVER IN MICHIGAN IN 1905 AND PRECEDING YEARS.

GENERAL PREVALENCE.

During the year 1905, scarlet fever was reported from 412 incorporated health jurisdictions in this State, with an aggregate of 2,286 cases, including 125 deaths.

In 1905, compared with the preceding year, there were 1,802 cases and 103 deaths less.

In 1905, compared with the average for twenty-two years, shown in Table 57, the numbers of cases and deaths and the death-rate per 100,000 of the population were considerably less, but the fatality (deaths per 100 cases) was slightly more.

A comparison of the death rates in Tables 57 and 58 shows that, from 1870 to 1883, inclusive, the death rates from scarlet fever were much higher than in any year since that time, the highest rates being in the years prior to the establishment of the State Board of Health.

TABLE 57.—*The prevalence of scarlet fever, in Michigan, during the twenty-two years, 1884–1905.*

Years.	Population. (Estimated for intercensal years.)	Reported cases.*	Reported deaths.	Deaths per 100 cases.	Deaths per 100,000 of the population.
1884.....	1,853,658	2,476	230	9.3	12.4
1885.....	1,893,697	2,750	187	6.8	9.9
1886.....	1,933,735	3,046	275	9.0	14.2
1887.....	1,973,774	3,400	314	9.2	15.9
1888.....	2,013,812	2,989	200	6.7	9.9
1889.....	2,053,851	3,535	166	4.7	8.1
1890.....	2,093,889	3,835	162	4.2	7.7
1891.....	2,130,827	6,212	286	4.6	13.4
1892.....	2,167,765	7,075	487	6.9	22.5
1893.....	2,204,703	6,065	415	6.8	18.8
1894.....	2,241,641	5,500	203	3.7	9.1
1895.....	2,271,531	3,908	125	3.2	5.5
1896.....	2,301,421	2,646	81	3.1	3.5
1897.....	2,331,311	2,482	115	4.6	4.9
1898.....	2,361,201	2,409	100	4.2	4.2
1899.....	2,391,091	4,345	171	3.9	7.2
1900.....	2,420,982	6,734	306	4.5	12.6
1901.....	2,450,872	7,726	208	3.9	12.2
1902.....	2,475,409	6,582	248	3.8	10.0
1903.....	2,502,758	5,353	212	4.0	8.5
1904.....	2,530,016	4,088	228	5.6	9.0
1905.....	2,557,275	2,286	125	5.5	4.9
Averages per year.....	2,234,332	4,338	224	5.2	10.0

*Only the fatal cases were reported from Laurium village, so that the figures in this column may not represent the numbers of cases which occurred.

TABLE 58.—*The numbers of deaths from scarlet fever, in Michigan, per 100,000 persons living, in each of the fifteen years, 1869–1883. Compiled from the Secretary of State's Vital Statistics of Michigan.*

Years.....	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
Deaths.....	22.1	72.0	56.6	44.3	43.9	32.2	30.0	27.4	26.9	27.7	26.3
Years.....	1880.	1881.	1882.	1883.	Average, 1869–1883.						
Deaths.....	22.7	22.8	34.3	37.9	35.1						

GEOGRAPHICAL DISTRIBUTION OF SCARLET FEVER.

Table 59 indicates that compared with the average for the entire State for the fourteen years, 1892-1905 (9.4 deaths per 100,000 inhabitants), scarlet fever was much more prevalent than the average, in the Upper Peninsular, Southeastern, Northern and Northeastern divisions.

The counties in which scarlet fever was unusually prevalent, in the fourteen years, 1892-1905, placed in the order of greatest death rates, are:

Otsego county.....	with a death rate of 34.5 per 100,000.
Oscoda county.....	" " " 33.8 " "
Houghton county.....	" " " 33.6 " "
Keweenaw county.....	" " " 30.6 " "
Mackinac county.....	" " " 26.5 " "
Gogebic county.....	" " " 25.3 " "
Chippewa county.....	" " " 21.3 " "
Lake county.....	" " " 18.4 " "
Macomb county.....	" " " 18.3 " "
Wexford county.....	" " " 18.2 " "
Crawford county.....	" " " 16.5 " "
Montmorency county.....	" " " 16.4 " "
Alpena county.....	" " " 15.9 " "
Wayne county.....	" " " 15.6 " "
Marquette county.....	" " " 15.1 " "
Gladwin county.....	" " " 14.2 " "
Antrim county.....	" " " 13.9 " "
Cheboygan county.....	" " " 12.9 " "
Schoolcraft county.....	" " " 12.6 " "
Dickinson county.....	" " " 12.0 " "
Missaukee county.....	" " " 11.6 " "
Osceola county.....	" " " 11.3 " "

TABLE 59.—*The geographical distribution of scarlet fever, in Michigan, in the fourteen years, 1892-1905, as indicated by the average numbers of cases and deaths, and the average deaths per 100,000 persons living, in each geographical division shown in the table.*

Geographical division.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
UPPER PENINSULAR DIVISION.	241,593	619	44.5	18.4
Alger county.....	5,567	11	.5	9.0
Baraga county.....	4,711	3	0	.....
Chippewa county.....	18,798	58	4	21.3
Delta county.....	22,910	41	2	8.7
Dickinson county.....	16,708	32	2	12.0
Gogebie county.....	15,794	43	4	25.3
Houghton county.....	56,529	198	19	33.6
Iron county.....	7,463	6	.4	5.4
Keweenaw county.....	3,268	6	1	30.6
Luce county.....	2,877	1	.2	7.0
Mackinac county.....	7,547	16	2	26.5
Marquette county.....	39,774	167	6	15.1
Menominee county.....	25,230	32	2	7.9
Ontonagon county.....	6,461	8	.4	6.2
Schoolcraft county.....	7,956	17	1	12.6
NORTHWESTERN DIVISION.	83,836	193	8.4	10.0
Benzie county.....	9,584	36	1	10.4
Grand Traverse county.....	20,328	54	2	9.8
Leelanau county.....	10,303	7	.4	3.9
Manistee county.....	27,181	54	2	7.4
Wexford county.....	16,440	42	3	18.2
NORTHERN DIVISION.	72,248	170	9.1	12.6
Antrim county.....	14,391	27	2	13.9
Charlevoix county.....	13,215	34	1	7.6
Cheboygan county.....	15,478	34	2	12.9
Crawford county.....	3,080	11	.5	16.5
Emmet county.....	13,813	30	1	7.2
Kalkaska county.....	6,524	21	.6	9.2
Otsego county.....	5,797	13	2	34.5
NORTHEASTERN DIVISION.	55,264	108	6.7	12.1
Alcona county.....	5,567	11	.5	9.0
Alpena county.....	18,826	33	3	15.9
Iosco county.....	11,126	19	1	9.0
Montmorency county.....	3,045	12	.5	16.4
Ogemaw county.....	6,975	24	.6	8.6
Oscoda county.....	1,777	4	.6	33.8
Presque Isle county.....	7,948	5	.5	6.3
WESTERN DIVISION.	268,380	502	17.5	6.5
Kent county.....	130,289	292	9	6.9
Lake county.....	5,441	22	1	18.4
Mason county.....	19,268	25	2	10.4
Muskegon county.....	37,003	65	2	5.4
Newaygo county.....	18,544	21	.7	3.8
Oceana county.....	17,124	25	.8	4.7
Ottawa county.....	40,708	52	2	4.9
NORTHERN CENTRAL DIVISION.	100,820	173.4	7.77	7.7
Clare county.....	8,486	8	.5	5.9
Gladwin county.....	6,326	11	.9	14.2
Isabella county.....	22,958	42	.6	2.6
Merosta county.....	20,852	36	2	9.6
Midland county.....	14,300	26	.7	4.9
Missaukee county.....	8,611	17	1	11.6
Oscoda county.....	17,662	33	.2	11.3
Roscommon county.....	1,639	.4	.07	4.3

*This footnote is below Table 57, on a preceding page.

TABLE 59.—CONCLUDED.

Geographical division.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
BAY AND EASTERN DIVISION.	342,191	613	26.7	7.8
Arenac county.....	8,538	15	.7	8.2
Bay county.....	63,228	126	6	9.5
Huron county.....	34,066	42	3	8.8
Lapeer county.....	28,117	66	2	7.1
Saginaw county.....	53,026	110	5	6.0
Sanilac county.....	34,702	40	2	5.8
St. Clair county.....	55,013	143	5	9.1
Tuscola county.....	35,501	71	3	8.5
CENTRAL DIVISION.	315,451	654	15.5	4.9
Barry county.....	23,023	26	.9	3.9
Clinton county.....	25,732	62	2	7.8
Eaton county.....	32,059	64	1	3.1
Genesee county.....	41,547	122	2	4.8
Gratiot county.....	29,542	41	1	3.4
Ingham county.....	41,178	81	2	4.9
Ionia county.....	35,035	89	2	5.7
Livingston county.....	19,739	37	.6	3.0
Montcalm county.....	33,956	67	2	5.9
Shiawassee county.....	33,640	65	2	5.9
SOUTHWESTERN DIVISION.	140,366	247	9.9	7.0
Allegan county.....	39,121	61	2	5.1
Berrien county.....	48,049	80	4	8.3
Cass county.....	20,846	36	.9	4.3
Van Buren county.....	32,550	70	3	9.2
SOUTHERN CENTRAL DIVISION.	317,048	641	15	4.7
Branch county.....	26,392	42	1	3.8
Calhoun county.....	50,020	71	1	2.0
Hillsdale county.....	29,991	52	1	3.3
Jackson county.....	47,274	100	2	4.2
Kalamazoo county.....	45,050	133	3	6.7
Lenawee county.....	48,687	111	3	6.2
St. Joseph county.....	24,330	51	1	4.1
Washtenaw county.....	45,304	81	3	6.6
SOUTHEASTERN DIVISION.	444,485	885	61	13.7
Macomb county.....	32,820	81	6	18.3
Monroe county.....	33,175	48	1	3.0
Oakland county.....	44,090	71	2	4.5
Wayne county.....	334,400	685	52	15.6

*This footnote is below Table 57 on a preceding page.

SCARLET FEVER IN URBAN AND RURAL LOCALITIES.

Table 60 indicates that, as a rule, scarlet fever is more prevalent and also more fatal in the urban localities.

The very high death rate in the group of localities of over 50,000 population was due to the rate of 9.4 deaths per 100,000 in the City of Detroit; and the very excessive death rate in the group of localities of from 5,000 to 10,000 population was due to the very excessively high death rate of 156.8 per 100,000 in the village of Laurium. Just how many cases occurred in the last named locality is not known because in recent years, the health officers did not make reports of either cases or deaths, and the information relative to the numbers of deaths had to be gleaned from the deaths returned to the Secretary of State.

TABLE 60.—*The prevalence of scarlet fever in urban and rural localities, in Michigan, in 1905.*

Localities—Grouped according to density of population.	Estimated population.	Health jurisdictions.			Cases.*	Deaths.	Death rates per 100,000 of the population.
		Total.	Infected.				
			Number.	Per cent of all jurisdictions.			
Cities over 50,000.....	423,319	2	2	100	414	33	7.8
Cities from 25,000 to 50,000.....	144,748	4	4	100	97	4	2.8
Cities from 10,000 to 25,000 and Calumet Township (17,153)....	257,596	18	13	72	270	6	2.3
Cities and villages from 5,000 to 10,000†.....	147,649	23	18	78	88	19	12.9
Cities and villages under 5,000†.....	375,013	364	83	23	378	17	4.5
Total urban.....	1,348,325	411	120	29	1,247	79	5.9
Balance of localities—principally townships‡.....	1,208,950	1,229	292	24	1,039	46	3.8

*This footnote is below Table 57, on a preceding page.

†Exclusive of twenty-seven villages in the two groups, for which the population in 1905 cannot be correctly estimated.

‡Includes the twenty-seven villages mentioned in the preceding paragraph, but does not include Calumet township, which for the purpose of this study, is included in the third group of urban localities, which have corresponding populations.

THE SEASONAL PREVALENCE OF SCARLET FEVER.

Table 61 shows that in the nine years, 1897-1905, the greatest number of persons taken sick with scarlet fever occurred in December and the least in August. The months of greatest prevalence are from October to March, both inclusive.

TABLE 61.—*The seasonal prevalence of scarlet fever, in Michigan, as indicated by the average numbers of persons taken sick from this disease in each month in the nine years, 1897-1905.*

Months	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Number of cases taken sick.....	454	380	346	309	302	234	203	195	282	365	412	487

THE REPORTED SOURCES OF CONTAGIUM IN SCARLET FEVER.

Table 62 shows that in but 21 per cent of the cases of scarlet fever which occurred in the 14 years, 1892-1904, was the source of the contagium definitely traced.

Of the 13,970 cases in which the source of contagium was given, 17 per cent were traced to a former case and three per cent to outside jurisdictions.* The movement of infection from one locality to another was unnecessary, and could and should have been prevented.

*A statement relative to the movements of infection in scarlet fever in 1905 may be found in Table 63, on a subsequent page.

For the past twenty-eight years this Department has labored with the people of this State for the restriction and prevention of scarlet fever, and it has been demonstrated, in season and out of season, that proper isolation and disinfection will eradicate this disease, yet we are confronted, year after year, with numerous instances of neglect, and in some cases, an utter disregard for the health and lives of the people.

There are many reasons for this condition, principal among which may be mentioned the difficulties attending the proper isolation of the sick and all exposed and infected persons.

Restrictive measures mean inconvenience to the families of the sick, and, in many instances, considerable expense to the locality, and many health officers are hindered in their work by the selfishness of the people whom they wish to keep within certain bounds, or by the thought, born of experience, that if they do all that is necessary, the bills contracted may be held up by an over zealous board of supervisors, or other auditing board.

Failure on the part of attending physicians to coöperate with the local health officers, and failure on the part of local officers to take advantage of the aid which this Department can give them in outbreaks of disease, are responsible for very many cases, not only of scarlet fever, but of many other preventable diseases.

The recognition of personal responsibility in matters pertaining to the public health will do much toward the eradication of disease. This applies not only to the person who may, in any manner, expose others to disease, but to those who by any act of their own, or by their indifference, may negative the whole or any part of the work of those engaged in the suppression of diseases.

The following instances of some sources of contagium in scarlet fever in 1905, are considered worthy of special mention:

SCARLET FEVER IN 1905 DUE TO INFECTED PREMISES AND CLOTHING.

Eighteen cases of scarlet fever, including three deaths, occurred in Salem township, Allegan county, and the source of infection was given in but three cases. This outbreak commenced in July, 1903, and continued through 1904 and 1905, and into 1906, it is believed, as the result of the incompleteness of the restrictive measures, to which reference was made in the article on scarlet fever in the annual report of this Department for 1905. A letter from the health officer in 1904 stated that it was difficult to properly disinfect the houses in winter because there was no place to house the people while it was being done, and the Secretary of this Board pointed out to him the necessity for the establishment of a place for these persons to go to until disinfection was accomplished. The continuation of the disease in this locality would indicate that this recommendation was not carried out.

One case of scarlet fever in Saugatuck village was said to be due to a case of scarlet fever in the same house several years previous.

One case of scarlet fever in Emerson township, Gratiot Co., due to an outbreak in the same house two years previous.

Three cases of scarlet fever in Comins township, Oscoda Co., were said to be due to infected premises, and one case to infected clothing.

Eight cases of scarlet fever in Plymouth village were said to have come from three infected houses.

SCARLET FEVER CONTRACTED FROM A CASE OF SO-CALLED MEASLES.

A case of scarlet fever in Almont township, Lapeer Co., was said to be due to visiting a house where they had a case of sickness called measles.

SCARLET FEVER FROM INFECTED BOOKS AND PAPERS.

An outbreak of scarlet fever in Salem township, Allegan Co., was said to be due to infection in old papers.

Eight cases of scarlet fever, including one death, in Scotville village, was said to be due to the purchase of second hand books.

TABLE 62.—*The reported sources of contagium in 67,199 cases of scarlet fever, in Michigan, in fourteen years, 1892-1905.*

Sources of contagium.	Number of cases.	Per cent of all cases.
Traced to a former case.....	11,453	17
Traced to outside jurisdictions.....	2,089	3
Infected houses, articles of clothing, etc.....	335	Too
Insanitary surroundings.....	60	small
At school.....	18	to be
Letters, papers, books, etc., from infected premises.....	15	considered.

TABLE 63.—*Localities from which and to which scarlet fever was spread, during the year 1905.*

Spread from:	To:	Spread from:	To:
Allegan County, Fennville Village.	Van Buren County, Antwerp Township.	Ingham County, Alsiedon Township.	Ingham County, Meridian Township.
Alpena County, (Locality not given).	Alcona County, Mitchell Township.	Ingham County, Lansing City.	St. Joseph County, Sherman Township.
Bay County, Bay City.	Crawford County, Grayling Village.	Ionia County, Orleans Township.	Ionia County, Ronald Township.
Bay County, Beaver Township.	Bay County, Kawkawlin Township.	Ionia County, Saranac Village.	Ionia County, Keene Township.
Bay County, Fraser Township.	Wexford County, Cadillac City.	Iosco County, East Tawas City.	Iosco County, Baldwin Township.
Branch County, Bronson Township.	St. Joseph County, Burr Oak Village.	Iosco County, Sherman Township.	Arenac County, Clayton Township.
Branch County, Coldwater City.	Washtenaw County, Augusta Township.	Jackson County, Concord Township.	Jackson County, Concord Village.
Calhoun County, Albion Township.	Jackson County, Concord Township.	Jackson County, Grass Lake Village.	Jackson County, Grass Lake Township.
Chippewa County, Sault Ste. Marie.	Schoolcraft County, Germfask Township.	Jackson County, Jackson City.	Washtenaw County, Chelsea Village.
Clare County, Farwell Village.	Missaukee County, Norwich Township.	Jackson County, Spring Arbor Township.	Jackson County, Parma Township.
Clinton County, Greenbush Township.	Shiawassee County, Fairfield Township.	Kalamazoo County, Richland Township.	Kalamazoo County, Ross Township.
Eaton County, Olivet Village.	Calhoun County, Lee Township.	Kalkaska County, Kalkaska Township.	Kalkaska County, Orange Township.
Grand Traverse County, (Locality not given).	Antrim County, Elk Rapids Village.	Kent County, Rockford Village.	Kent County, Plainfield Township.
Grand Traverse County, Kingsley Village.	Grand Traverse County, Blair Township.	Lapeer County, Burnside Township.	Lapeer County, North Branch Township.
Grand Traverse County, Traverse City.	Leelanau County, Solon Township.	Livingston County, Green Oak Township.	Livingston County, Brighton Village.
Houghton County, Calumet Township.	Houghton County, Red Jacket Village.	Livingston County, Howell Village.	Livingston County, Howell Township.

TABLE 63.—CONCLUDED.

Spread from:	To:	Spread from:	To:
Mason County, Ludington City.	Manistee County, Manistee City.	Van Buren County, Bloomingdale Village.	Van Buren County, Geneva Township.
Montcalm County, Richland Township.	Montcalm County, Ferris Township.	Van Buren County, South Haven City.	Van Buren County, South Haven Township.
Montmorency County, Avery Township.	Montmorency County, Briley Township.	Washtenaw County, Ann Arbor City.	Barry County, Middleville Village.
Oakland County, Rochester Village.	Muskegon County, Muskegon City.	Washtenaw County, Ann Arbor City.	Washtenaw County, Saline Township.
Oscoda County, Ewart Village.	Oscoda County, Richmond Township.	Wayne County, Detroit City.	Lapeer County, Dryden Village.
Ottawa County, Holland City.	Missaukee County, Reeder Township.	Wayne County, Detroit City.	Sanilac County, Elk Township.
Presque Isle County, Onaway Village.	Alpena County, Green Township.	FROM OUTSIDE THE STATE TO LOCALITIES IN MICHIGAN.	
Saginaw County, Frankenmuth Township.	Tuscola County, Tuscola Township.		
St. Clair County, Riley Township.	Macomb County, Richmond Township.		
St. Joseph County, Burr Oak (Vil. or Twp).	Branch County, Girard Township.	Spread from:	To:
St. Joseph County, Mendon Village.	St. Joseph County, Park Township.	Dakota, (Locality not given).	Washtenaw County, Dexter Village.
Shiawassee County, Byron Township.	Allegan County, Dorr Township.	Illinois, Chicago.	Manistee County, Manistee City.
Shiawassee County, Owosso City.	Shiawassee County, Rush Township.	Ohio, Toledo.	Hillsdale County, Hillsdale City.
		Ohio, Toledo.	Monroe County, Monroe City.

PERIODS OF INCUBATION, INFLUENCE OF AGE AND SEX, AND DURATION OF
SICKNESS, IN SCARLET FEVER.

In this report, the usual tables relative to the periods of incubation, influence of age and sex, and the duration of sickness, in scarlet fever, are omitted, having been discontinued with the annual report for 1905. Summaries of studies of these phases of the disease, extending over a period of eleven years, may be found in the annual report for 1905.

RESTRICTIVE AND PREVENTIVE MEASURES IN SCARLET FEVER.

When it is remembered that for 28 years the State Health Department has conducted an active campaign against scarlet fever, and that in every outbreak which has come to the knowledge of the Department the health officer has been prompted by the Department as to the best methods for restricting the disease, and has been supplied with literature for distribution among the families and neighbors of sick persons, the figures shown in Table 64 are not a very encouraging sample of results. It is gratifying to note, however, that the numbers of outbreaks in which isolation and disinfection were both enforced has increased from 7 per cent in 1891 to 26 per cent in 1905.

There are very many new health officers to be educated each year in the methods of restricting disease, and many of them not only do not receive ample compensation for their labors, but are often denied the support and appreciation which their labors demand, and sometimes subjected to abuse. Under such conditions, it is not strange that many outbreaks of disease are not restricted to the first case, or to the one household where the outbreak begins.

TABLE 64.—*Restrictive and preventive measures in 1,277 outbreaks of scarlet fever, in Michigan, in 1904 and 1905.*

Placarding, isolation and disinfection.	Number of outbreaks.	Per cent of all outbreaks.
All enforced.....	337	26
All neglected.....	133	10

MEASLES IN MICHIGAN IN 1905 AND PRECEDING YEARS.

GENERAL PREVALENCE.

During the year 1905, there were reported to the Michigan State Department of Health 382 outbreaks of measles, which resulted in 6,061 cases, including 111 deaths.

Only the fatal cases were reported from Detroit and probably many other localities, and very many cases occurred in localities throughout the State which were not reported to the local health officials, and therefore could not be reported to the State Health Department.

In 1905, compared with the preceding year, there were 4,325 cases and 65 deaths less from this disease.

In 1905, compared with the average for 15 years, 1890-1904, there were 5,554 cases and twenty-one deaths less from this disease.

A comparison of the death rates in Tables 66 and 67 indicates that, with the exception of the year 1900, as a rule, measles was much more prevalent in the years prior to the inauguration by this Department, in 1890, of active measures for its restriction, than in the years since that time.

TABLE 66.—*The prevalence of measles, in Michigan, during the sixteen years, 1890–1905.*

Years.	Population. (Estimated for intercensal years.)	Reported cases.*	Reported deaths.	Deaths per 100 cases.*	Deaths per 100,000 of the population.
1890.....	2,093,889	11,911	140	1.2	6.7
1891.....	2,130,827	12,173	149	1.2	7.0
1892.....	2,167,765	3,830	76	2.0	3.5
1893.....	2,204,703	7,334	119	1.6	5.4
1894.....	2,241,641	10,518	55	.5	2.5
1895.....	2,271,531	3,870	12	.3	.5
1896.....	2,301,421	15,409	156	1.0	6.8
1897.....	2,331,311	32,543	159	.5	6.8
1898.....	2,361,201	11,614	124	1.1	5.3
1899.....	2,391,091	12,005	166	1.4	6.9
1900.....	2,420,982	20,403	282	1.4	11.6
1901.....	2,450,872	4,629	62	1.3	2.5
1902.....	2,475,499	11,978	162	1.4	6.5
1903.....	2,502,758	8,941	140	1.6	5.6
1904.....	2,520,016	10,386	176	1.7	7.0
1905.....	2,557,275	6,061	111	1.8	4.3
Averages per year.....	2,339,549	11,475	131	1.1	5.6

*Only the fatal cases were reported from Detroit, and probably many other localities, so that the figures in this column do not nearly represent the numbers of cases which occurred.

TABLE 67.—*The numbers of deaths from measles, in Michigan, per 100,000 persons living, in each of the twenty-one years, 1869–1889. Compiled from the Secretary of State's Vital Statistics of Michigan.*

Years.....	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
Deaths.....	12.9	4.7	5.5	14.1	18.6	3.4	9.5	8.1	4.1	1.0	10.5
Years.....	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	Av 1869– 1889.
Deaths.....	7.6	15.2	8.7	14.5	7.9	2.0	6.8	14.6	20.6	5.1	9.3

GEOGRAPHICAL DISTRIBUTION OF MEASLES.

Table 6S indicates that, compared with the average death rate for the entire State for the thirteen years, 1893-1905 (5.6 per 100,000), measles was much more prevalent than usual in the Upper Peninsula, and quite evenly distributed throughout the other divisions. It was least prevalent in the Central Division.

The counties in which measles was unusually prevalent in the thirteen years, 1893-1904, placed in the order of greatest death rates, are as follows:

	death rate	20.2	per	100,000.
Alger county.....	"	18.7	"	"
Baraga county.....	"	17.4	"	"
Luce county.....	"	15.8	"	"
Bay county.....	"	14.4	"	"
Alcona county.....	"	13.7	"	"
Antrim county.....	"	12.8	"	"
Delta county.....	"	12.0	"	"
Dickinson county.....	"	11.6	"	"
Oceana county.....	"	11.5	"	"
Oscoda county.....	"	11.3	"	"
Missaukee county.....	"	9.6	"	"
Mecosta county.....	"	9.5	"	"
Montmorency county.....	"	8.6	"	"
Isabella county.....	"	7.6	"	"
Marquette county.....	"	7.6	"	"
Kalkaska county.....	"	7.6	"	"
Leelanau county.....	"	7.6	"	"
Branch county.....	"	7.3	"	"
Manistee county.....	"	7.1	"	"
Ogemaw county.....	"	7.1	"	"
Iron county.....	"	7.1	"	"

TABLE 68.—*The geographical distribution of measles, in Michigan, in the thirteen years, 1893-1905, as indicated by the average numbers of cases and deaths, and the average deaths per 100,000 persons living, in each geographical division shown in the table.*

Geographical divisions.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
UPPER PENINSULA DIVISION.	243,237	1,469	44.78	18.4
Alger county.....	4,941	33	1	20.2
Baraga county.....	4,821	8	.9	18.7
Chippewa county.....	19,215	57	1	5.2
Delta county.....	23,362	83	3	12.8
Dickinson county.....	16,695	57	2	12.0
Gogebie county.....	15,794	109	1	6.3
Houghton county.....	57,956	431	3	5.2
Iron county.....	7,034	44	.5	7.1
Keweenaw county.....	3,818	27	.2	6.0
Luce county.....	2,872	19	.5	17.4
Mackinac county.....	7,449	53	.08	1.1
Marquette county.....	39,701	415	3	7.6
Menominee county.....	25,385	30	.9	3.5
Ontonagon county.....	6,650	50	.3	4.5
Schoolcraft county.....	8,044	53	.4	5.0
NORTHWESTERN DIVISION.	85,134	513	5.1	6.0
Benzie county.....	9,891	87	.3	3.0
Grand Traverse county.....	20,788	109	1	4.8
Leelanau county.....	10,459	51	.8	7.6
Manistee county.....	27,228	196	2	7.3
Wexford county.....	16,768	70	1	6.0
NORTHERN DIVISION.	73,347	458	5.2	7.1
Antrim county.....	14,617	121	2	13.7
Charlevoix county.....	13,416	95	.5	3.7
Cheboygan county.....	15,663	32	.7	4.5
Crawford county.....	3,008	21	.2	6.6
Emmet county.....	14,169	117	.9	6.4
Kalkaska county.....	6,595	52	.5	7.6
Otsego county.....	5,879	20	.4	6.8
NORTHEASTERN DIVISION.	55,285	236	2.7	4.9
Alcona county.....	5,544	52	.8	14.4
Alpena county.....	18,971	53	.5	2.6
Iosco county.....	10,682	24	.2	1.9
Montmorency county.....	3,142	30	.3	9.5
Ogemaw county.....	7,026	44	.5	7.1
Oscoda county.....	1,745	2	.2	11.5
Presque Isle county.....	8,175	31	.2	2.4
WESTERN DIVISION.	269,124	2,074	14.1	5.2
Kent county.....	131,292	1,354	6	4.6
Lake county.....	5,312	28	.2	3.8
Mason county.....	19,392	74	1	5.2
Muskegon county.....	36,564	168	2	5.5
Newaygo county.....	18,307	72	.9	4.9
Oceana county.....	17,172	140	2	11.6
Ottawa county.....	41,085	238	2	4.9
NORTHERN CENTRAL DIVISION.	101,751	591	7.46	7.3
Clare county.....	8,505	67	.5	5.9
Gladwin county.....	6,442	18	.08	1.2
Isabella county.....	23,156	153	2	8.6
Mecosta county.....	20,853	144	2	9.6
Midland county.....	14,528	70	.8	5.5
Missaukee county.....	8,831	42	1	11.3
Oscoda county.....	17,836	90	1	5.6
Rosebush county.....	4,600	7	.08	5.0

*This footnote is below Table 66, on a preceding page.

TABLE 68.—CONCLUDED.

Geographical divisions.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
BAY AND EASTERN DIVISION.	342,815	1,151	19.8	5.8
Arenac county.....	8,715	19	.2	2.3
Bay county.....	63,425	268	10	15.8
Huron county.....	34,360	50	.8	2.3
Lapeer county.....	28,047	115	.8	2.9
Saginaw county.....	82,727	261	3	3.6
Sanilac county.....	34,768	145	2	5.8
St. Clair county.....	55,146	202	2	3.6
Tuscola county.....	35,627	91	1	2.8
CENTRAL DIVISION.	316,075	1,719	12.5	4.0
Barry county.....	22,988	162	.7	3.0
Clinton county.....	25,697	135	1	3.9
Eaton county.....	32,043	272	1	3.1
Genesee county.....	41,707	188	1	2.4
Gratiot county.....	29,505	163	2	6.8
Ingham county.....	41,386	163	2	4.8
Ionia county.....	35,223	178	1	2.8
Livingston county.....	19,674	117	.8	4.1
Montcalm county.....	34,065	118	2	5.9
Shiawassee county.....	33,787	223	1	3.0
SOUTHWESTERN DIVISION.	141,178	895	7	5.0
Allegan county.....	39,115	265	2	5.1
Berrien county.....	48,500	292	3	6.2
Cass county.....	20,854	107	1	4.8
Van Buren county.....	32,709	231	1	3.1
SOUTHERN CENTRAL DIVISION.	318,204	2,084	13	4.1
Branch county.....	26,382	205	2	7.6
Calhoun county.....	50,444	312	1	2.0
Hillsdale county.....	29,972	215	2	6.7
Jackson county.....	47,401	211	1	2.1
Kalamazoo county.....	45,418	400	3	6.6
Lenawee county.....	48,703	357	1	2.1
St. Joseph county.....	24,348	170	1	4.1
Washtenaw county.....	45,536	214	2	4.4
SOUTHEASTERN DIVISION.	449,416	702	27	6.0
Macomb county.....	32,894	80	1	3.0
Monroe county.....	33,250	116	2	6.0
Oakland county.....	44,313	238	2	4.5
Wayne county.....	338,950	268	22	6.5

*This footnote is below Table 66, on a preceding page.

SEASONAL PREVALENCE, INFLUENCE OF AGE AND SEX, AND DURATION OF SICKNESS, IN MEASLES.

By reason of the fact that very many cases of measles are not reported to this Department, and for the further reason that studies relative to the seasonal prevalence, influence of age and sex, and duration of sickness, in measles, have been made for periods ranging from eight to twelve years, the usual tables relative to these phases of the disease have been discontinued. Summaries of the results of these studies may be found in the annual report of this Department for 1905.

REPORTED SOURCES OF CONTAGIUM IN MEASLES.

Table 69 shows that the source of contagium in measles is given in but 28 per cent of the cases reported.

Of this number nearly all are reported as due to direct infection, and a very small proportion to infected houses, articles, etc.

About four per cent of the cases of measles which are traced to their source are due to the movement from one locality to another of persons infected with or who have been exposed to the disease. Table 70 shows the places from which and to which measles was spread in 1905.

TABLE 69.—*The reported sources of contagium in 159,521 cases of measles, in Michigan, in the fourteen years, 1892-1905.*

Reported sources of contagium.	Number of cases.	Per cent of all cases.
Traced to a former case.....	38,048	24
Traced to outside jurisdictions.....	6,323	4
At school.....	123	Too small
Infected houses, articles of clothing, etc.....	22	to be
Through the mails.....	6	considered.

TABLE 70.—*Localities from which and to which measles was spread, during the year 1905.*

Spread from:	To:	Spread from:	To:
Alcona County, Harrisville Village.	Presque Isle County, Onaway City.	Cheboygan County, (Locality not given).	Ionia County, Ionia City.
Alcona County, (Locality not given).	Cheboygan County, Forest Township.	Clinton County, Ovid Village.	Clinton County, Maple Rapids Village.
Allegan County, Watson Township.	Allegan County, Martin Township.	Eaton County, Charlotte City.	Eaton County, Roxand Township.
Alpena County, Alpena City.	Montmorency County, Hillman Village.	Eaton County, Roxand Township.	Eaton County, Chester Township.
Alpena County, (Locality not given).	Alcona County, Mitchell Township.	Eaton County, Roxand Township.	Eaton County, Mulliken Village.
Barry County, Hope Township.	Barry County, Hastings City.	Genesee County, Fenton Village.	Genesee County, Argentine Township.
Bay County, Bay City.	Barry County, Carleton Township.	Genesee County, Flint City.	Genesee County, Richfield Township.
Bay County, Bay City.	Crawford County, Grayling Village.	Genesee County, Flushing Village.	Shiawassee County, Vernon Township.
Bay County, Bay City.	Alcona County, Harrisville Village.	Genesee County, Montrose Village.	Saginaw County, Birch Run Township.
Bay County, Bay City.	Midland County, Ingersoll Township.	Genesee County, Otisville Village.	Lapeer County, Otter Lake Village.
Bay County, Bay City.	Calhoun County, Tekonsha Village.	Gogebic County, Ironwood City.	Gogebic County, Bessemer City.
Bay County, Beaver Township.	Bay County, Williams Township.	Huron County, Colfax Township.	Huron County, Bad Axe City.
Calhoun County, Battle Creek City.	Calhoun County, Albion City.	Ingham County, Williamston Village.	Montmorency County, Bridley Township.
Cass County, Cassopolis Village.	Cass County, Lagrange Township.	Ionia County, Belding City.	Gratiot County, Hamilton Township.
Cass County, Dowagiac City.	Cass County, Volinia Township.	Ionia County, Belding City.	Gratiot County, Lafayette Township.
Cass County, Newberg Township.	St. Joseph County, Constantine Township.	Ionia County, Belding City.	Mecosta County, Wheatland Township.

TABLE 70.—CONTINUED.

Spread from:	To:	Spread from:	To:
Ionia County, Ionia City.	Ionia County, Orange Township.	Kent County, Grand Rapids City.	Eaton County, Charlotte City.
Ionia County, Ionia City.	Ionia County, Ronald Township.	Kent County, Grand Rapids City.	Isabella County, Blanchard Township.
Kalamazoo County, Climax Village.	Kalamazoo County, Climax Township.	Kent County, Grand Rapids City.	Kent County, Cedar Springs Village.
Kalamazoo County, Climax Village.	Van Buren County, Hartford Village.	Kent County, Grand Rapids City.	Kent County, Vergennes Township.
Kalamazoo County, Climax Village.	Calhoun County, Leroy Township.	Kent County, Grand Rapids City.	Muskegon County, Muskegon City.
Kalamazoo County, Kalamazoo City.	Calhoun County, Marshall City.	Kent County, Grand Rapids City.	Ottawa County, Allendale Township.
Kalamazoo County, Kalamazoo City.	Kalamazoo County, Pavilion Township.	Kent County, Grand Rapids City.	Wexford County, Cadillac City.
Kalamazoo County, Kalamazoo City.	Kent County, Solon Township.	Kent County, Grandville Village.	Montcalm County, Pine Township.
Kalamazoo County, Kalamazoo City.	Calhoun County, Tekonsha Township.	Kent County, Lowell Village.	Ionia County, Saranac Village.
Kalamazoo County, Kalamazoo City.	Kalamazoo County, Vicksburg Village.	Kent County, Solon Township.	Kent County, Cannon Township.
Kalamazoo County, Schoolcraft Village.	Kalamazoo County, Prairie Ronde Township.	Kent County, Sparta Village.	Kent County, Algoma Township.
Kent County, Algoma Township.	Kent County, Courtland Township.	Kent County, Sparta Village.	Kent County, Alpine Township.
Kent County, Cannon Township.	Kent County, Algoma Township.	Kent County, Sparta Village.	Kent County, Sparta Township.
Kent County, Cannon Township.	Kent County, Rockford Village.	Kent County, Sparta Village.	Kent County, Tyrone Township.
Kent County, Grand Rapids City.	Allegan County, Watson Township.	Lake County, Baldwin Village.	Newaygo County, Troy Township.
Kent County, Grand Rapids City.	Calhoun County, Tekonsha Township.	Lapeer County, North Branch Village.	Lapeer County, Burnside Township.

TABLE 70.—CONTINUED.

Spread from:	To:	Spread from:	To:
Lapeer County, (Locality not given).	Tuscola County, Koylton Township.	Montcalm County, Greenville City.	Montcalm County, Pierson Township.
Lenawee County, Hudson City.	Hillsdale County, Wright Township.	Montcalm County, Stanton City.	Montcalm County, Evergreen Township.
Lenawee County, Palmyra Township.	Lenawee County, Ogden Township.	Presque Isle County, Onaway City.	Iosco County, East Tawas City.
Livingston County, Brighton Village.	Livingston County, Fowlerville Village.	Presque Isle County, Onaway City.	Montmorency County, Briley Township.
Luce County, McMillan Township.	Luce County, Lakefield Township.	Saginaw County, Tittabawassee Township.	Marquette County, Republic Township.
Manistee County, Bear Lake Township.	Manistee County, Bear Lake Village.	St. Clair County, Berlin Township.	Macomb County, Ray Township.
Manistee County, Brown Township.	Manistee County, Bear Lake Township.	St. Clair County, Capae Village.	Lapeer County, Almont Village.
Manistee County, Manistee City.	Manistee County, Brown Township.	St. Clair County, Riley Township.	St. Clair County, Berlin Township.
Manistee County, Marilla Township.	Manistee County, Bear Lake Township.	St. Clair County, Yale Village.	St. Clair County, Brookway Township.
Manistee County, Onkama Village.	Manistee County, Onkama Township.	St. Clair County, Yale Village.	Sanilac County, Speaker Township.
Manistee County, Springdale Township.	Manistee County, Bear Lake Township.	St. Joseph County, Three Rivers City.	Cass County, Cassopolis Village.
Marquette County, Negaunee City.	Marquette County, Negaunee Township.	Sanilac County, Brown City Village.	Huron County, Oliver Township.
Mason County, Scottville Village.	Benzie County, Thompsonville Village.	Sanilac County, (Locality not given).	Jackson County, Spring Arbor Township.
Mecosta County, Big Rapids Township.	Mason County, Custer Village.	Tuscola County, Fremont Township.	Tuscola County, Vassar Township.
Mecosta County, Fork Township.	Mecosta County, Chippewa Township.	Wexford County, (Locality not given).	Grand Traverse County, Green Lake Township.
Montcalm County, Douglass Township.	Montcalm County, Pine Township.		

TABLE 70.—CONCLUDED.

FROM OUTSIDE THE STATE TO LOCALITIES IN MICHIGAN.		Spread from:	To:
		Indiana, South Bend.	Cass County, Calvin Township.
		Indiana, (Locality not given).	Montmorency County, Albert Township.
		Nebraska, Lincoln.	Lenawee County, Ridgeway Township.
		New York, Long Island.	Kalamazoo County, Richland Township.
		New York,	Genesee County, Montrose Village.
		New York,	Kent County, Rockford Village.
		Ohio, (Locality not given).	Hillsdale County, Wright Township.
		Russia,	Berrien County, St. Joseph City.
		Washington, Seattle.	Bay County, Merritt Township.
Spread from:	To:		
California, (Locality not given).	Mason County, Ludington City.		
Canada, Toronto.	Jackson County, Rives Township.		
Illinois, Chicago.	Berrien County, Benton Township.		
Illinois, Chicago.	Berrien County, Weesaw Township.		
Illinois, Chicago.	Van Buren County, Keeler Township.		
Indiana, (Locality not given).	Berrien County, Watervliet Village.		
Indiana, South Bend.	Berrien County, Lake Township.		

MEASLES BROUGHT INTO THE STATE BY IMMIGRANTS.

In January, 1905, a party of immigrants from Russia arrived in St. Joseph city, and within a few days after their arrival a child belonging to the party was taken sick with measles. By reason of the restrictive measures instituted by the health officer, the disease was prevented from spreading from this household. There were three cases in the outbreak, one of which terminated fatally. This Department was not notified by the Immigration officers of the arrival of these immigrants at the port of debarkation, and the usual warning to the health officer of St. Joseph city could not be given.

RESTRICTIVE AND PREVENTIVE MEASURES IN MEASLES.

Table 71 indicates that, in 1904 and 1905, in but eight per cent of all outbreaks of measles were restrictive measures of isolation and disinfection both enforced.

The apathy of the people in respect to the restriction and prevention of measles has done much to discourage those who would put forth their best energies in the work of restricting this often underestimated but really dangerous disease.

Parents are ignorant of or indifferent to the danger to be apprehended from the exposure of their children to measles, and, in many instances,

do not secure the services of a physician for their children when suffering from this disease. Many parents are also ignorant of their duty, under the law, in respect to the reporting of cases of measles to the local health officials, and, as a consequence, the health officials are not in a position to institute restrictive measures or to make complete reports to this Department relative to the prevalence of measles in their locality. To the parents then we must look primarily for any considerable reduction in the sickness and mortality from measles, and for more complete reports of the disease. This means educational work on the part of those who have charge of the health service of the State, both local and general, and the State Health Department stands ready at all times to assist the local health officials in this educational work, by means of advice, and by the furnishing of documents on the restriction and prevention of measles for distribution among the families and neighbors of those sick with the disease. A leaflet issued by the local board of health, setting forth the dangerous character of measles and the duty of householders in outbreaks of the disease, and widely distributed at a time when measles was present in any locality, would, it is believed, prove to be one of the best methods for securing the coöperation of the people in the restriction of the disease. And the educational work should be continued from time to time as measles may appear in the locality until the people are thoroughly awakened to the necessity for its restriction.

A suggested form of leaflet for this purpose, which, however, may be changed to suit the needs of the locality, is shown below:

MEASLES IS PRESENT IN THIS LOCALITY.

Measles is a Dangerous Disease, and Can and Should Be Restricted and Prevented.

In Michigan, measles causes eleven times as many deaths as does smallpox, and yet the people become alarmed whenever smallpox appears in a locality, and immediately institute rigid measures for its restriction, even to the extent of placing guards outside the premises where it occurs to maintain the quarantine.

There are two erroneous and very harmful beliefs, quite prevalent among parents,—that measles cannot ultimately be escaped any more than teething, and that the least dangerous time for persons to have the disease is while quite young children. Statistics have proved that measles can be restricted and prevented, and that the disease is most fatal among the very young, sixty-four per cent of all the deaths from measles occurring in those under five years.

If then we safeguard our children, especially the very young, from the infection of measles, the probability of their dying from or even contracting the disease in advanced youth, or in the years of maturity or old age, will be very remote.

But the fatality from measles is not the only danger to be apprehended. Measles is frequently complicated with or followed by the two most dangerous diseases,—pneumonia and tuberculosis—and often leaves a weakness of the eyes, ears, bowels and the respiratory organs.

Upon the outbreak of measles in any household, it is the duty of the householder, and the attending physician, if any is called, to at once notify the local health officer of the same, and every person who has any regard for the welfare of the community should cheerfully comply with the law in this particular.

Measles may be spread by the sick before the eruption appears, and, for this reason,

the parents of young children should be suspicious of a troublesome cough, or frequent sneezing, especially if accompanied by a fever, and should immediately separate the child so affected from the well persons, and keep him or her isolated until satisfied that the symptoms are not those of measles or of any other dangerous communicable disease.

Information relative to the proper methods of restricting and preventing measles may be obtained by application to the health officer of the locality.

By order of the Board of Health of the.....of.....,

President.

Secretary.

Date.

TABLE 71.—*Restrictive and preventive measures in 1,113 outbreaks of measles, in Michigan, in 1904 and 1905.*

Placarding, isolation and disinfection.	Number of outbreaks.	Per cent of all outbreaks.
All enforced.....	93	8
All neglected.....	150	13

SMALLPOX IN MICHIGAN IN 1905 AND PRECEDING YEARS.

GENERAL PREVALENCE.

During the year 1905, there were reported to the State Department of Health 374 outbreaks of smallpox, in 301 localities, resulting in 2,985 cases, including 74 deaths.

In 1905, compared with the numbers of cases and deaths from smallpox in the preceding year, there were 2,768 cases less and 50 deaths more.

In 1905, compared with the average numbers of cases and deaths from smallpox for the four years, 1901-1904, there were 3,082 cases less and 42 deaths more.

A comparison of smallpox in 1905 with the years prior to 1901 may be made by reference to Table 72, in which it will be seen that from 1882 to 1901 there was, comparatively, but little smallpox in the State. The fatality (deaths per 100 cases), however, was very much greater in the years in which deaths occurred prior to 1901.

Table 73 shows that the average number of deaths from smallpox, per 100,000 of the population, for the thirteen years prior to the institution, by this Department, of active measures for the restriction of the disease, was very much greater than the average for the twenty-four years since that time. Excluding the year 1882, in which the results of the educational work could scarcely be expected to show any marked results, the death rate for the twenty-three years, ending in 1905, was but seven-tenths of one per cent per 100,000.

TABLE 72.—*The prevalence of smallpox, in Michigan, during the twenty-four years, 1882–1905.*

Years.	Population. (Estimated for intercensal years.)	Reported cases.	Reported deaths.	Deaths per 100 cases.	Deaths per 100,000 of the population.
1882.....	1,745,298	589	159	27.0	9.1
1883.....	1,799,478	29	2	6.9	.1
1884.....	1,853,658	22	3	13.6	.2
1885.....	1,893,697	27	6	22.2	.3
1886.....	1,933,735	24	7	29.2	.4
1887.....	1,973,774	4	0	0	0
1888.....	2,013,812	42	6	14.3	.3
1889.....	2,053,851	57	4	7.0	.2
1890.....	2,093,889	2	0	0	0
1891.....	2,130,827	3	0	0	0
1892.....	2,167,765	1	1	100.0	.05
1893.....	2,204,703	10	3	30.0	.1
1894.....	2,241,641	285	60	21.1	2.7
1895.....	2,271,531	187	47	25.1	2.1
1896.....	2,301,421	38	16	42.1	.7
1897.....	2,331,311	15	0	0	0
1898.....	2,361,201	32	1	3.1	.04
1899.....	2,391,091	139	6	4.3	.3
1900.....	2,420,982	694	9	1.3	.4
1901.....	2,450,872	5,088	31	.6	1.3
1902.....	2,475,499	7,086	40	.6	1.6
1903.....	2,502,758	6,341	33	.5	1.3
1904.....	2,530,016	5,753	24	.4	.9
1905.....	2,557,275	2,985	74	2.5	2.9
Averages per year.....	2,195,837	1,227	22	1.8	1.0

TABLE 73.—*The numbers of deaths from smallpox, in Michigan, per 100,000 persons living, in each of the thirteen years, 1869–1881. Compiled from the Secretary of State's Vital Statistics of Michigan.*

Years	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	Average, 1869–81.
Deaths.....	3.7	0.8	6.0	23.7	7.0	1.3	1.8	5.2	6.8	0.4	0.4	0.2	4.9	4.8

GEOGRAPHICAL DISTRIBUTION OF SMALLPOX.

Table 74 indicates that, according to the average death rate from smallpox for the entire State (1.1 per 100,000 of the population), during the eight years, 1898-1905, smallpox was more prevalent than usual in the western, northeastern, northern and southern central divisions.

As indicated by the death rates, the counties in which smallpox was much more than usually prevalent, during the eight years, 1898-1905, placed in the order of greatest death rates, are:

	death rate	6.3	per 100,000.
Jackson county.....	" "	4.3	" "
Presque Isle county.....	" "	3.9	" "
Mackinac county.....	" "	3.7	" "
Kent county.....	" "	3.2	" "
Delta county.....	" "	3.1	" "
Emmet county.....	" "	3.1	" "
Arenac county.....	" "	2.8	" "
Kalkaska county.....	" "	2.4	" "
Chippewa county.....	" "	2.2	" "
Osceola county.....	" "	2.1	" "
Alpena county.....	" "	1.9	" "
Antrim county.....	" "	1.8	" "
Cheboygan county.....	" "	1.5	" "
Shiawasse county.....	" "	1.5	" "
Mason county.....	" "	1.4	" "
Mecosta county.....	" "	1.4	" "
Huron county.....	" "	1.4	" "
Grand Traverse county.....	" "	1.4	" "

TABLE 74.—*The geographical distribution of smallpox, in Michigan, in the eight years, 1898-1905, as indicated by the average numbers of cases and deaths, and the average deaths per 100,000 persons living, in each geographical division shown in the table.*

Geographical division.	Average.			
	Population.	Cases.	Deaths.	Death rates.
UPPER PENINSULAR DIVISION.	261,108	300	2.9	1.1
Alger county.....	6,002	8	0	.....
Baraga county.....	5,002	8	0	.....
Chippewa county.....	21,132	41	.5	2.4
Delta county.....	25,310	44	.8	3.2
Dickinson county.....	17,793	10	0	.....
Gogebie county.....	15,594	12	0	.....
Houghton county.....	65,201	43	.5	.8
Iron county.....	8,728	8	0	.....
Keweenaw county.....	3,674	1	0	.....
Luce county.....	3,212	5	0	.....
Mackinac county.....	7,675	28	.3	3.9
Marquette county.....	40,393	23	.5	1.2
Menominee county.....	26,286	53	.3	1.1
Ontonagon county.....	6,693	2	0	.....
Schoolcraft county.....	8,413	14	0	.....
NORTHWESTERN DIVISION.	89,278	89	.4	.4
Benzie county.....	10,592	15	0	.....
Grand Traverse county.....	22,185	34	.3	1.4
Leelanau county.....	10,835	5	0	.....
Manistee county.....	27,630	7	0	.....
Wexford county.....	18,036	28	.1	.6
NORTHERN DIVISION.	79,731	291	1.3	1.6
Antrim county.....	15,671	48	.3	1.9
Charlevoix county.....	14,699	38	0	.....
Cheboygan county.....	16,466	87	.3	1.8
Crawford county.....	3,234	9	0	.....
Emmet county.....	16,068	42	.5	3.1
Kalkaska county.....	7,118	35	.2	2.8
Otsego county.....	6,475	32	0	.....
NORTHEASTERN DIVISION.	57,553	202	1.0	1.7
Alcona county.....	5,622	23	0	.....
Alpena county.....	19,421	61	.4	2.1
Iosco county.....	10,096	39	.1	1.0
Montmorency county.....	3,434	13	0	.....
Ogemaw county.....	7,884	33	.1	1.3
Oscoda county.....	1,697	4	0	.....
Presque Isle county.....	9,399	29	.4	4.3
WESTERN DIVISION.	273,647	347	6.2	2.3
Kent county.....	135,263	156	.5	3.7
Lake county.....	5,041	14	0	.....
Mason county.....	19,681	44	.3	1.5
Muskegon county.....	36,510	26	.3	.8
Newaygo county.....	18,007	18	.1	.6
Oceana county.....	17,389	35	0	.....
Ottawa county.....	41,756	54	.5	1.2
NORTHERN CENTRAL DIVISION.	105,265	408	1.2	1.1
Clare county.....	8,770	35	.1	1.1
Gladwin county.....	7,298	33	0	.....
Isabella county.....	23,814	112	.3	1.3
Mecosta county.....	20,769	64	.3	1.4
Midland county.....	14,947	35	0	.....
Missaukee county.....	9,649	45	.1	1.0
Osceola county.....	18,395	79	.4	2.2
Roscommon county.....	1,623	5	0	.....

TABLE 74.—CONCLUDED.

Geographical division.	Average.			
	Population.	Cases.	Deaths.	Death rates.
BAY AND EASTERN DIVISION.	346,120	745	3.2	.9
Arenac county.....	9,626	35	.3	3.1
Bay county.....	63,987	253	.6	.9
Huron county.....	35,096	68	.5	1.4
Lapeer county.....	27,592	32	.1	.4
Saginaw county.....	83,344	175	.9	1.1
Sanilac county.....	35,071	78	.3	.9
St. Clair county.....	55,315	44	.4	.7
Tuscola county.....	36,089	60	.1	.3
CENTRAL DIVISION.	316,137	516	1.8	.6
Barry county.....	22,557	24	0	.....
Clinton county.....	25,382	56	.3	1.2
Eaton county.....	31,602	52	.1	.3
Genesee county.....	42,252	64	.3	.7
Grafiot county.....	29,945	102	.4	1.3
Ingham county.....	42,131	23	0	.....
Ionia county.....	35,160	62	.1	.3
Livingston county.....	19,263	4	0	.....
Montcalm county.....	33,770	65	.1	.3
Shiawassee county.....	34,075	64	.5	1.5
SOUTHWESTERN DIVISION.	142,922	106	.9	.6
Allegan county.....	39,034	23	.1	.3
Berrien county.....	49,612	38	.4	.8
Cass county.....	20,617	10	0	.....
Van Buren county.....	33,659	35	.4	1.2
SOUTHERN CENTRAL DIVISION.	322,096	192	4.8	1.5
Branch county.....	26,583	7	.3	1.1
Calhoun county.....	51,681	60	.3	.6
Hillsdale county.....	29,845	24	.4	1.3
Jackson county.....	47,708	30	.3	6.3
Kalamazoo county.....	47,085	23	.4	.8
Lenawee county.....	48,790	10	.1	.2
St. Joseph county.....	23,803	11	.3	1.3
Washtenaw county.....	46,601	27	0	.....
SOUTHEASTERN DIVISION.	463,892	324	4.5	1.0
Macomb county.....	33,122	37	.4	1.2
Monroe county.....	23,177	33	0	.....
Oakland county.....	45,113	23	.1	.2
Wayne county.....	362,480	231	.4	1.1

THE PREVALENCE OF SMALLPOX IN URBAN AND RURAL LOCALITIES IN MICHIGAN,
IN 1905.

Table 75 indicates that, judging by the per cent of infected localities, and the death rates per 100,000 of the population, smallpox was most prevalent in the urban localities. The very high death rates of 8.3 per 100,000 in the first two groups were due to the high rates in the cities of Grand Rapids (35.5) and Jackson (43.5).

In 1905, the case rate for smallpox (number of cases per 100,000 of the population) in the rural localities was slightly higher than the case rate in urban localities.

The localities which, in 1905, had a much greater number of cases than the case rate for the State as a whole (116.7 cases per 100,000 of the population) are as follows:

ALGER COUNTY—Mathias township; ALLEGAN COUNTY—Dorr township, Laketown township, Overisel township and Wayland township; ALPENA COUNTY—Alpena township; ANTRIM COUNTY—Custer township, Forest Home township, Helena township, Kearney township, Bellaire village and Elk Rapids village; ARENAC COUNTY—Standish township, Turner township and Omer city; BARRY COUNTY—Barry township; BAY COUNTY—Bangor township, Beaver township, Garfield township, Kawkawlin township, Merritt township, Pineconning township, Portsmouth township and Bay City; BERRIEN COUNTY—Sodus township and Watervliet village; CALHOUN COUNTY—Bedford township, Lee township, Newton township and Battle Creek city; CASS COUNTY—Dowagiac city; CHARLEVOIX COUNTY—Hayes township and Boyne Falls village; CHEBOYGAN COUNTY—Burt township, Inverness township, Mackinac City village and Cheboygan city; CHIPPEWA COUNTY—Superior township and Trout Lake township; CLARE COUNTY—Hamilton township; CLINTON COUNTY—Bath township and Dewitt township; DELTA COUNTY—Nahma township and Escanaba city; DICKINSON COUNTY—Felah township; EATON COUNTY—Bellevue township, Benton township, Carmel township, Chester township, Eaton Rapids township, Kalama township, Roxand township, Walton township, Charlotte city and Grand Ledge city; EMMET COUNTY—Cross Village township, Little Traverse township and Readmond township; GENESEE COUNTY—Thetford township and Vienna township; GLADWIN COUNTY—Butman township, Clement township, Gladwin township and Sage township; GRAND TRAVERSE COUNTY—Grant township, Paradise township, Union township and Fife Lake village; GRATIOT COUNTY—Bethany township, Emerson township, Lafayette township, Pine River township, Alma village, Ithaca village and St. Louis city; HILLSDALE COUNTY—Adams township, Cambria township and Hillsdale city; HURON COUNTY—Caseville township, Lake township and Pigeon village; INGHAM COUNTY—Delhi township; IRON COUNTY—Bates township, Stambaugh township, Iron River village and Stambaugh village; ISABELLA COUNTY—Coe township, Coldwater township, Fremont township, Rolland township, Shepherd village and Mount Pleasant city; JACKSON COUNTY—Blackman township, Columbia township, Grass Lake township, Leoni township, Summit township and Jackson city; KALAMAZOO COUNTY—Cooper township, Pavilion township and Kalamazoo city; KALKASKA COUNTY—Excelsior township and Rapid River township; KENT COUNTY—Courtland township, Plainfield township, Spencer township, Walker township, Cedar Springs village and Grand Rapids city; LAKE COUNTY—Baldwin village; LAPEER COUNTY—Marathon township and Rich township; LEELANAU COUNTY—Bingham township and Leelanau township; LENAWEE COUNTY—Adrian township and Dover township; MACKINAC COUNTY—Hendricks township, Newton township, St. Ignace township and St. Ignace city; MACOMB COUNTY—Erin township; MANISTEE COUNTY—Springdale township; MARQUETTE COUNTY—Wells township; MECOSTA COUNTY—Chippewa township, Fork township, Millbrook township, Sheridan township, Wheatland township and Big Rapids city; MENOMINEE COUNTY—Harris township; MIDLAND COUNTY—Larkin township; MISSAUKEE COUNTY—Caldwell township and Forest township; MONROE COUNTY—Ida township; MONTCALM COUNTY—Bloomer township, Bushnell township, Evergreen township, Ferris township, Pierson township, Edmore village, Howard City village, Greenville city and Stanton city; MONTMORENCY COUNTY—Albert township; MUSKEGON COUNTY—Muskegon township, Fruitport village and Montague village;

NEWAYGO COUNTY—Ensley township; OCEANA COUNTY—Colfax township and Crystal township; OGEMAW COUNTY—Churchill township, Hill township, Horton township, Richland township, West Branch township and West Branch village; OSCEOLA COUNTY—Hartwick township, Highland township, Marion township, Middle Branch township, Osceola township, Rose Lake township and Marion village; OSCODA COUNTY—Mentor township; OTTAWA COUNTY—Blendon township, Georgetown township, Grand Haven township, Holland township, Jamestown township, Spring Lake township, Spring Lake village, Grand Haven city and Holland city; PRESQUE ISLE COUNTY—Ocqueoc township; ROSCOMMON COUNTY—Nester township; SAGINAW COUNTY—Brady township, Brant township, Bridgeport township, Chapin township, Frankenmuth township, Jonesfield township, Saginaw township and Saginaw city; SCHOOLCRAFT COUNTY—Hiawatha township; SHIAWASSEE COUNTY—Antrim township, Rush township, Sciota township, Laingsburg village and Perry village; ST. CLAIR COUNTY—Lynn township and Yale village; ST. JOSEPH COUNTY—Constantine village; TUSCOLA COUNTY—Almer township, Denmark township, Gilford township and Mayville village; VAN BUREN COUNTY—Paw Paw township and Gobleville village; WASHTENAW COUNTY—Manchester village and Ypsilanti city; WAYNE COUNTY—Romulus township and River Rouge village; WEXFORD COUNTY—Greenwood township.

TABLE 75.—*The prevalence of smallpox in urban and rural localities, in Michigan, in 1905.*

Localities—Grouped according to density of population.	Estimated population.	Health jurisdictions.				Deaths.	Death rates per 100,000 of the population.
		Total.	Infected.		Cases.*		
			Number.	Per cent of all jurisdictions.			
Cities over 50,000.....	423,319	2	2	100	304	35	8.3
Cities from 25,000 to 50,000.....	144,748	4	4	100	421	12	8.3
Cities from 10,000 to 25,000 and Calumet township (17,518).....	257,596	18	12	67	164	3	1.2
Cities and villages from 5,000 to 10,000†.....	147,649	23	11	48	164	1	.7
Cities and villages under 5,000†.....	375,013	364	57	16	485	9	2.4
Total urban.....	1,348,325	411	86	21	1,538	60	4.4
Balance of localities—principally townships‡.....	1,208,950	1,229	215	17	1,417	14	1.2

*This footnote is below Table 72, on a preceding page.

†Exclusive of twenty-seven villages in the two groups, for which the population in 1905 cannot be correctly estimated.

‡Includes the twenty-seven villages mentioned in the preceding paragraph, but does not include Calumet township, which, for the purpose of this study, is included in the third group of urban localities, which have corresponding populations.

SEASONAL PREVALENCE OF SMALLPOX.

The usual table relative to the seasonal prevalence of smallpox has been discontinued. A summary of the studies of this phase of the disease during the five years ending in 1904 may be found in the annual report of this Department for 1905.

THE REPORTED SOURCES OF CONTAGIUM IN SMALLPOX.

Table 76 indicates that in but 47 per cent of the whole number of cases which occurred during the 12 years, 1894-1905, was the source of the contagium located, and reported to this Department. It will be seen that about 61 per cent of the cases in which a source was reported were due to the movement, from one locality to another, of persons suffering from or who had been exposed to smallpox. In very many instances the disease was so mild that the patients did not call in a physician or take to their beds, and in this way many of them were enabled to move about from place to place without let or hindrance on the part of the local health officials. Table 77 shows the reported movements of infection in smallpox in 1905.

TABLE 76.—*The reported sources of contagium in 28,643 cases of smallpox, in Michigan, in the twelve years, 1894-1905.*

Reported sources.	Number of cases.	Per cent of all cases.
Traced to outside jurisdictions.....	7,608	27
Traced to a former case.....	4,890	17
Infected clothing.....	50	Too small to be considered.
Letters from infected premises.....	3	

TABLE 77.—*Localities from which and to which smallpox was spread, during the year 1905.*

Spread from:	To:	Spread from:	To:
Allegan County, Laketown Township.	Ottawa County, Holland City.	Calhoun County, Battle Creek City.	Eaton County, Walton Township.
Allegan County, Fillmore Township.	Ottawa County, Holland Township.	Cheboygan County, Cheboygan City.	Cheboygan County, Inverness Township.
Antrim County, Bellaire Village.	Antrim County, Kearney Township.	Cheboygan County, Hebron Township.	Cheboygan County, Beaumont Township.
Antrim County, Bellaire Village.	Antrim County, Forest Home Township.	Cheboygan County, (Locality not given).	Antrim County, Bellaire Village.
Antrim County, Helena Township.	Antrim County, Custer Township.	Cheboygan County, Mackinaw City Village.	Wexford County, Cadillac City.
Arenac County, Standish Township.	Arenac County, Turner Township.	Cheboygan County, Mackinaw City Village.	Cheboygan County, Cheboygan City.
Bay County, Bay City.	Tuscola County, Gilford Township.	Cheboygan County, Wolverine Village.	Lake County, Baldwin Village.
Bay County, Bay City.	Ingham County, Lansing City.	Chippewa County, Sault Ste. Marie City.	Mackinac County, Hendricks Township.
Bay County, Bay City.	Macomb County, Mt. Clemens City.	Chippewa County, Trout Lake Township.	Chippewa County, Bruce Township.
Bay County, Bay City.	Lapeer County, Rich Township.	Clinton County, St. Johns City.	Genesee County, Burton Township.
Bay County, (Locality not given).	Saginaw County, Buena Vista Township.	Clinton County, Bath Township.	Shiawassee County, Laingsburg Village.
Bay County, Merritt Township.	Bay County, Portsmouth Township.	Delta County, Escanaba City.	Mackinac County, Newton Township.
Calhoun County, Athens Village.	Branch County, Union City Village.	Delta County, Gladstone City.	Eaton County, Charlotte City.
Calhoun County, Battle Creek City.	Calhoun County, Bedford Township.	Delta County, Masonville Township.	Delta County, Gladstone City.
Calhoun County, Battle Creek City.	Eaton County, Bellevue Township.	Eaton County, Benton Township.	Eaton County, Chester Township.
Calhoun County, Battle Creek City.	Eaton County, Charlotte City.	Eaton County, Bellevue Township.	Eaton County, Kalamo Township.

TABLE 77.—CONTINUED.

Spread from:	To:	Spread from:	To:
Eaton County, Bellevue Township.	Eaton County, Roxand Township.	Gratiot County, (Locality not given).	Montcalm County, Bushnell Township.
Eaton County, Bellevue Township.	Eaton County, Walton Township.	Gratiot County, Lafayette Township.	Gratiot County, Emerson Township.
Emmet County, Carp Lake Township.	Cheboygan County, Cheboygan City.	Gratiot County, St. Louis City.	Gratiot County, Bethany Township.
Emmet County, Carp Lake Township.	Cheboygan County, Inverness Township.	Huron County, Bad Axe City.	Sanilac County, Moore Township.
Emmet County, Harbor Springs Village.	Emmet County, Little Traverse Township.	Ingham County, Aurelius Township.	Eaton County, Eaton Rapids Township.
Emmet County, Readmond Township.	Emmet County, Harbor Springs Village.	Ingham County, Lansing City.	Gratiot County, Alma City.
Emmet County, (Locality not given).	Washtenaw County, Ypsilanti City.	Ingham County, Lansing City.	Clinton County, Bath Township.
Genesee County, Flint City.	Oakland County, Pontiac City.	Ingham County, Lansing City.	Gratiot County, Bethany Township.
Gladwin County, Butman Township.	Gladwin County, Clement Township.	Ingham County, Lansing City.	Kent County, Caledonia Township.
Gladwin County, Gladwin City.	Clare County, Hamilton Township.	Ingham County, Lansing City.	Ingham County, Delhi Township.
Gladwin County, (Locality not given).	Saginaw County, Chapin Township.	Ingham County, Lansing City.	Eaton County, Grand Ledge City.
Grand Traverse County, Kingsley Village.	Ottawa County, Blendon Township.	Ingham County, Lansing City.	Livingston County, Howell Village.
Gratiot County, Alma City.	Eaton County, Delta Township.	Ingham County, Lansing City.	Ingham County, Lansing Township.
Gratiot County, Alma City.	Clinton County, St. Johns City.	Ingham County, Lansing City.	Marquette County, Negawuee City.
Gratiot County, Elba Township.	Shiawassee County, Rush Township.	Ingham County, Lansing City.	Gratiot County, St. Louis City.
Gratiot County, Ithaca Village.	Gratiot County, North Star Township.	Ingham County, Lansing City.	Cass County, Wayne Township.

TABLE 77.—CONTINUED.

Spread from:	To:	Spread from:	To:
Ionia County, Belding City.	Emmet County, Petoskey City.	Jackson County, Jackson City.	Washtenaw County, Manchester Village.
Ionia County, Ronald Township.	Montcalm County, Evergreen Township.	Jackson County, Jackson City.	Calhoun County, Marengo Township.
Iron County, Bates Township.	Iron County, Stambaugh Village.	Jackson County, Jackson City.	Van Buren County, Paw Paw Township.
Isabella County, Coe Township.	Isabella County, Shepherd Village.	Jackson County, Jackson City.	Jackson County, Spring Arbor Township.
Isabella County, Rolland Township.	Isabella County, Fremont Township.	Jackson County, Jackson City.	Wayne County, Sumpter Township.
Isabella County, Shepherd Village.	Griati County, Alma City.	Kalamazoo County, Climax Township.	Kalamazoo County, Pavilion Township.
Isabella County, Shepherd Village.	Isabella County, Coe Township.	Kalamazoo County, Kalamazoo City.	Calhoun County, Battle Creek City.
Isabella County, Shepherd Village.	Clinton County, St. Johns City.	Kalamazoo County, Kalamazoo City.	Van Buren County, Geneva Township.
Jackson County, Blackman Township.	Jackson County, Grass Lake Township.	Kalamazoo County, Kalamazoo City.	Van Buren County, Paw Paw Village.
Jackson County, Jackson City.	Hillsdale County, Adams Township.	Kent County, Grand Rapids City.	Allegan County, Wayland Township.
Jackson County, Jackson City.	Lenawee County, Adrian Township.	Kent County, Grand Rapids City.	Berrien County, Watervliet Village.
Jackson County, Jackson City.	Jackson County, Columbia Township.	Kent County, Grand Rapids City.	Emmet County, Petoskey City.
Jackson County, Jackson City.	Hillsdale County, Hillsdale City.	Kent County, Grand Rapids City.	Charlevoix County, Boys Falls Village.
Jackson County, Jackson City.*	Kalamazoo County, Kalamazoo City.	Kent County, Grand Rapids City.	Kent County, Courtland Township.
Jackson County, Jackson City.	Jackson County, Leoni Township.	Kent County, Grand Rapids City.	Kent County, Sparta Township.
Jackson County, Jackson City.	Washtenaw County, Lima Township.	Kent County, Grand Rapids City.	Kent County, Spencer Township.

TABLE 77.—CONTINUED.

Spread from:	To:	Spread from:	To:
Kent County, Grand Rapids City.	Kent County, Walker Township.	Macomb County, New Baltimore Village.	Macomb County, Chesterfield Township.
Kent County, Grand Rapids City.	Kent County, Wyoming Township.	Mecosta County, Morley Township.	Kent County, Wyoming Township.
Kent County, Grand Rapids City.	Leelanau County, Bingham Township.	Missaukee County, Lake Township.	Wexford County, Cadillac City.
Kent County, Grand Rapids City.	Muskegon County, Muskegon City.	Monroe County, Ida Township.	Monroe County, La Salle Township.
Kent County, Grand Rapids City.	Newaygo County, Fremont Village.	Monroe County, La Salle Township.	Monroe County, Monroe City.
Kent County, Grand Rapids City.	Ottawa County, Georgetown Township.	Monroe County, Milan Township.	Monroe County, Ida Township.
Kent County, Grand Rapids City.	Ottawa County, Holland Township.	Ogemaw County, West Branch Township.	Gladwin County, Clement Township.
Kent County, Grand Rapids City.	Ottawa County, Holland City.	Ogemaw County, West Branch Township.	Ogemaw County, Horton Township.
Kent County, Plainfield Township.	Kent County, Rockford Village.	Osceola County, Highland Township.	Osceola County, Hartwick Township.
Kent County, Rockford Village.	Ottawa County, Jamestown Township.	Osceola County, Highland Township.	Osceola County, Marion Township.
Leelanau County, Leelanau Township.	Benzie County, Homestead Township.	Osceola County, Highland Township.	Osceola County, Marion Village.
Leelanau County, Leland Township.	Leelanau County, Centreville Township.	Osceola County, Marion Village.	Montcalm County, Bloomer Township.
Livingston County, Hamburg Township.	Livingston County, Howell Village.	Osceola County, Marion Village.	Missaukee County, Riverside Township.
Mackinac County, St. Ignace Township.	Mackinac County, St. Ignace City.	Osceola County, (Locality not given).	Ingham County, Lansing City.
Mackinac County, Hendricks Township.	Mackinac County, Newton Township.	Ottawa County, Grand Haven City.	Ottawa County, Grand Haven Township.
Macomb County, Mt. Clemens City.	Macomb County, New Baltimore Village.	Ottawa County, Grand Haven City.	Ottawa County, Spring Lake Township.

TABLE 77.—CONCLUDED.

Spread from:	To:	Spread from:	To:
Ottawa County, Holland City.	Allegan County, Laketon Township.	Wayne County, Huron Township.	Wayne County, River Rouge Village.
Ottawa County, Holland City.	Allegan County, Overisal Township.	Wexford County, Harrietta Village.	Isabella County, Mt. Pleasant City.
Rosecommon County, Nester Township.	Gladwin County, Butman Township.	Wexford County, (Locality not given).	Grand Traverse County, Paradise Township.
Saginaw County, Buena Vista Township.	Bay County, Portsmouth Township.	FROM OUTSIDE THE STATE TO LOCALITIES IN MICHIGAN.	
Saginaw County, Saginaw City.	Huron County, Caseville Township.	Spread from:	To:
Saginaw County, Saginaw City.	Gratiot County, Emerson Township.	Canada, (Locality not given).	Delta County, Escanaba City.
Saginaw County, Saginaw City.	Tuscola County, Caro Village.	Illinois, Chicago.	Cass County, Pokagon Township.
Saginaw County, St. Charles Village.	Arenae County, Standish Township.	Illinois, Chicago.	St. Joseph County, Constantine Village.
St. Clair County, Emmet Village.	Washtenaw County, Ypsilanti City.	Indiana, (Locality not given).	Isabella County, Coe Township.
Shiawassee County, Antrim Township.	Livingston County, Conway Township.	Louisiana, New Orleans.	Ingham County, Lansing City.
Shiawassee County, Antrim Township.	Shiawassee County, Morrie Village.	Minnesota, Minneapolis.	Baraga County, Avon Township.
Washtenaw County, Ann Arbor City.	Oscoda County, Ewart Village.	Ohio, Toledo.	Monroe County, Ida Township.
Washtenaw County, Chelsea Village.	Washtenaw County, Ann Arbor City.	Wisconsin, Florence County.	Iron County, Iron River Village.
Wayne County, Detroit City.	Ottawa County, Zeeland Township.	Wisconsin, Hurley.	Dickinson County, Iron Mountain City.
Wayne County, Detroit City.	Wayne County, Romulus Township.	Wisconsin, Saxon.	Gogebic County, Wakefield Township.

PERIODS OF INCUBATION, INFLUENCE OF AGE, AND DURATION OF SICKNESS
IN SMALLPOX.

By reason of a lack of information relative to the periods of incubation, influence of age and duration of sickness, in smallpox, the usual tables relative to these phases of the disease have been discontinued. The tables relative to the periods of incubation and influence of age were last printed in the annual report of this Department for 1905, and the table relative to the duration of sickness in the annual report for 1904.

RESTRICTIVE AND PREVENTIVE MEASURES IN SMALLPOX.

Table 78 shows that of the total number of persons who suffered from smallpox in 1904 and 1905 (8,738), but 680 or 8 per cent, had ever been vaccinated. The table also indicates that of the 1,088 outbreaks of smallpox in 1904 and 1905, general vaccination was recommended by the local boards of health in 415, or 38 per cent, but the recommendations were adopted in but 113, or 10 per cent, notwithstanding that free vaccination had been offered by the localities in 26 per cent of the outbreaks.

Table 78a indicates that in but 34 per cent of the outbreaks of smallpox in 1904 and 1905 were the patients isolated and the premises disinfected after death or recovery of the patients. This may be accounted for by the fact that, in many instances, owing to the mildness of the disease, the health officers were not notified of the disease in time to institute these restrictive and preventive measures.

Table 78b indicates that of the persons who were exposed to smallpox in 1904 and 1905 and who had not been vaccinated, a large majority were isolated for periods ranging from 14 to 21 days.

TABLE 78.—*Restrictive and preventive measures in 1,088 outbreaks of smallpox, in Michigan in 1904 and 1905.*

Vaccination and revaccination.	Numbers of instances.
Persons vaccinated at some time prior to sickness..... { Yes.....	*680
..... { No.....	4,050
Outbreaks in which exposed persons were vaccinated..... { Yes.....	359
..... { No.....	404
Outbreaks in which exposed persons <i>not</i> vaccinated were isolated..... { Yes.....	†426
..... { No.....	156
Outbreaks in which general vaccination was recommended..... { Yes.....	415
..... { No.....	413
Outbreaks in which free vaccination was offered..... { Yes.....	283
..... { No.....	550
Outbreaks in which vaccination was general..... { Yes.....	113
..... { No.....	666

*The time of vaccination of these persons is shown in Table 79, on a subsequent page.

†The periods of isolation of these persons is shown in Table 78b.

TABLE 78a.—*Isolation and disinfection in 1,034 outbreaks of smallpox, in Michigan, in 1904 and 1905.*

Isolation and disinfection.	Number of outbreaks.	Per cent of all outbreaks.
Both enforced.....	353	34
Both neglected.....	44	4

TABLE 78b.—*The time during which unvaccinated persons, who were exposed to smallpox, in Michigan, in 1904 and 1905, were isolated.**

Number of days isolated.....	2	5	6	8	9	10	11	12	13	14	15
Instances in each period of days.....	4	1	1	3	2	15	1	6	2	60	26
Number of days isolated.....	16	17	18	19	20	21	22	23	24	25	27
Instances in each period of days.....	68	10	16	1	26	57	2	4	4	3	3
Number of days isolated.....	28	30	31	32	33	34	35	36	37	38	39
Instances in each period of days.....	6	15	2	4	1	2	7	3	2	3	1
Number of days isolated.....	40	41	42	43	44	45	47	49	50	55	56
Instances in each period of days.....	5	1	5	3	2	2	1	1	1	1	2
Number of days isolated.....	60	68	90								
Instances in each period of days.....	1	1	1								

*In 36 instances, not included in this table, the number of days was not definitely stated, as 5-10; 9 to 12; 20-60, etc.

THE EFFICACY OF VACCINATION.

As possibly indicating the efficacy of vaccination in the prevention of smallpox, Table 79 has been prepared. It will be seen that of 387 persons included in the table, the date of whose vaccination was definitely reported, about 10 per cent had been vaccinated within a month preceding the sickness; twelve per cent during the same year as the occurrence; and fifty-eight per cent at sometime within the five years immediately preceding the sickness. In view of the general belief that vaccination once in every five years is a preventive against smallpox, the table should have indicated the greatest number of cases as having been vaccinated more than five years prior to the sickness. It is believed that a continuation of this study for a number of years will present a different result from that shown in the table.

Still further evidence of the efficacy of vaccination may be found in the fact that of those persons who suffered from smallpox in 1904 and 1905 and who had been previously vaccinated, not one died from the disease.

TABLE 79.—*The time which elapsed between previous vaccination and the beginning of sickness in smallpox patients, in Michigan, in 1904 and 1905.**

Time.....	Same day.	1 day.	3 days.	5 days.	7 days.	10 days.	21 days.	1 mo.	2 mos.	1 year.	2 years.
Number of cases.....	7	5	9	7	5	2	2	1	1	8	96
Time.....	3 years.	4 years.	5 years.	6 years.	7 years.	8 years.	9 years.	10 years.	12 years.	15 years.	16 years.
Number of cases.....	31	28	23	4	4	3	3	8	2	5	2
Time.....	20 years.	21 years.	24 years.	25 years.	30 years.	31 years.	35 years.	40 years.	45 years.	50 years.	53 years.
Number of cases.....	33	1	1	4	7	1	2	4	1	3	1
Time.....	55 years.	60 years.	2-10 years.	3-13 years.	3-4 years.	2-40 years.	3-20 years.	7-8 years.	3-45 years.	8-15 years.	10-12 years.
Number of cases.....	1	1	5	4	1	24	8	2	3	1	9
Time.....	10-15 years.	12-14 years.	20-25 years.	30-40 years.							
Number of cases.....	8	3	2	1							

*There were 287 cases, not included in this table, which had been vaccinated prior to the sickness from smallpox, but in which the time of vaccination was indefinite or not stated.

SPECIAL INVESTIGATION RELATIVE TO AN OUTBREAK OF SMALLPOX IN THE VILLAGE OF LOWELL.

On June 21, 1906, Secretary Shumway was called to make investigation relative to the continuance of smallpox in the village of Lowell. There were about forty-six cases then present and seventeen places under quarantine. There was no pest house or detention hospital, and the village was practically dead from a business standpoint. A mass meeting was called, and the necessity for hospital accommodation and the cooperation of the people, particularly of physicians, was pointed out. Some of the physicians were opposed to any action for the restriction of the disease, but the local board of health and the mayor and common council were all active in following the suggestions made, and the disease was practically under control within the next six weeks.

SPECIAL INVESTIGATION RELATIVE TO SMALLPOX IN CHIPPEWA COUNTY.

As smallpox had been present for some time in Eckerman, Brimley, Trout Lake and Spur 451,—places adjacent to Sault Ste. Marie—and persons afflicted were coming into the city of Sault Ste. Marie from lumber camps and dredges in the river, and spreading the disease in that city, upon request of the local health authorities, the State Department of Health was called upon for assistance, the places where the disease existed being outside of the jurisdiction of the city board of health. On July 27, 1905, Secretary Shumway of the State Department visited Sault Ste. Marie and made an investigation.

The places where the disease existed had practically no means of carrying out restrictive measures, many of those taken sick being turned out of the lumber camps, and coming to the Soo (that being the nearest railroad point) exposed many to the disease.

At the request of the Local Board of Health of Sault Ste. Marie, and with the consent of the Governor, Secretary Shumway appointed Dr. Griffin of Sault Ste. Marie, Contagious Disease Inspector for Chippewa county for the term of one year, giving him authority over contagious diseases in that county. By vigorous work on the part of this Inspector, aided by the Health Board of Sault Ste. Marie, smallpox has been almost entirely eliminated from the county, and a saving made both in health and financially to that locality.

A series of resolutions passed by the Health Board of Sault Ste. Marie, together with a contract entered into by said Board and the State Department, continues the Inspector for another year and is on file in the office of the Secretary of the State Board at Lansing.

YELLOW FEVER IN MICHIGAN IN 1905.

In August, 1905, a case of yellow fever was reported from Crockery township, Ottawa county.

The case came from the infected district of New Orleans, was taken sick August 20, and recovered September 7. The house was quarantined, and disinfected, but the quantity of disinfectants used was less than the amount recommended by this Department. No other cases were reported.

CHICKEN-POX (VARICELLA) IN MICHIGAN IN 1905.

During the year ending December 31, 1905, there were reported to this Department seventy-nine outbreaks of chicken-pox (varicella), in seventy-seven localities, resulting in 530 cases.

No fatal cases were reported, a circumstance which has not occurred in any previous year since 1901. From 1902 to 1904, inclusive, deaths, ranging from one to five, were reported annually.

So far as known, isolation and disinfection were enforced in only one of the outbreaks in 1905.

Whenever an outbreak occurs in the State, the following letter is sent to the health officer of that jurisdiction:

"I am informed that chicken-pox is present in your jurisdiction.

"Many times smallpox has been diagnosed as chicken-pox, and not infrequently physicians have insisted that cases of smallpox were chicken-pox. There has long been trouble of this kind, but the mildness of smallpox recently has made this error more common than formerly.

"By this mail I send you copies of the pamphlet issued by this Board, 'Vaccination and Revaccination,—The Prevention of Smallpox,' and because smallpox is so often diagnosed as chicken-pox, all persons exposed to such a disease should be vaccinated; it is a reasonable precaution, and the public health interests should be given the benefit of every doubt.

"Children having chicken-pox should not be allowed to attend school; they should be promptly isolated until it is proved beyond a doubt that it is not smallpox.

"It should be remembered that adults seldom have chicken-pox, therefore an eruption, especially a papular eruption, becoming vesicular, occurring in a person over ten or twelve years of age, should be regarded as probable smallpox, and the same precautions should be taken as in cases of recognized smallpox, until some competent authority has decided that it is not smallpox.

"This Board has not yet issued a printed leaflet relative to chicken-pox, but because of the above-mentioned reasons it is recommended that every case of chicken-pox be reported to the local health officer, and that prompt action be taken by him to restrict the disease, and to report the facts to the Secretary of the State Board of Health."

MUMPS (PAROTITIS) IN MICHIGAN IN 1905.

During the year 1905, only three outbreaks of mumps (parotitis) were reported from the same number of localities in this State.

In one locality only was the number of cases reported. No deaths were reported from this disease.

ERYSIPELAS IN MICHIGAN IN 1905.

During the year 1905, reports were received relative to thirty cases, including four deaths, from erysipelas, in seventeen localities in Michigan.

So far as could be learned, there was no connection between these cases and any of the cases of puerperal fever reported to this Department.

PUERPERAL FEVER IN MICHIGAN IN 1905.

During the year 1905, four cases of puerperal fever were reported from the same number of localities in this State. Three of the cases terminated fatally, but in the other case, the termination could not be learned.

The above-mentioned cases must not be understood to include all the cases of puerperal fever which occurred in 1905, because the reports of the disease are very meager.

So far as could be learned, there was no connection between these cases and any of the cases of erysipelas reported to this Department.

ITCH (SCABIES) IN MICHIGAN IN 1905.

During the year 1905, there were reported to this office ten outbreaks of itch (scabies), in ten localities, all of which occurred in the schools of these localities. In one locality, vermin was reported with itch. In one locality the outbreak was called impetigo contagiosa, and in another "Cuban itch."

In reply to a letter from this office asking for information relative to an outbreak of itch in Kingston village, the health officer of that locality wrote as follows:

"The itch here is scabies, not smallpox. The disease has been here several years. It is always more in evidence in winter. At the beginning of this school term the school board asked me regarding the disease. The Board has been satisfied to have the pupils remain from school one week to be treated but has not required them to be kept home until their skin is entirely smooth. I explained the disease to them and asked them to rule as they considered best. From all I can find out this is proving satisfactory."

In reply to this letter, the Secretary of this Department wrote as follows:

* * * "kindly permit me to suggest that you should not leave it to the school board to determine when it is safe for the infected children to return to school, but that you should determine that yourself, for the reason that you are a physician and better able to judge when the danger is past. Also, permit me to suggest that one week is rather a short period for infected children to remain at home as there would be some danger of their communicating the disease to others at the end of that period, unless they were completely cured. In justice to the other pupils, those who have the disease should remain away from school until they are entirely free from the disease. I trust that you will give this subject your immediate attention and do what is necessary to stamp out the disease."

TETANUS (LOCK-JAW) IN MICHIGAN IN 1905.

During the year 1905; there were reported to this Department, from twenty localities in Michigan, twenty-six cases of tetanus, twenty-four of which terminated fatally.

Of the twenty-four cases in which a source of infection was given, two fatal cases resulted from gun shot wounds; six cases, five of which terminated fatally, were due to blank cartridges; two fatal cases were reported as "umbilical"; three cases, two of which terminated fatally, were due to rusty nail wounds; two fatal cases resulted from accidents to the feet, and one fatal case resulted from each of the following causes:

Accidental wound of finger by rough tin; injury to fingers in cog wheels; rusty garden rake tooth; fall on hydrant in insanitary yard; thrown from wagon hurting palm of right hand; fall from building causing compound dislocation of ankle; sliver under nail of finger; self abortion and explosion of fire crackers. The source of infection in two fatal cases was not reported.

In fourteen cases, the average period of incubation (from the time of the wound or injury until tetanus developed) was seven days.

In twelve fatal cases, the average duration of the sickness (from the time tetanus developed until death occurred) was 3.6 days. In each of the two cases which recovered, the duration of the sickness was seventeen days.

The average ages of all cases which occurred was, for twenty-two males, 15.7 years, and, for four females, 14.3 years.

In the first part of this annual report is printed a statement relative to the efforts put forth by this Department, during the fiscal year 1906, for the prevention of tetanus, including a copy of the law regulating the sale of toy pistols and a history of the fatalities in Michigan and in the United States from the handling of fireworks in the years 1903-1905.

DISEASES OF ANIMALS, DANGEROUS TO MAN, IN MICHIGAN IN 1905.

Whenever information is received at this office of the occurrence of an outbreak of any disease of animals, which, by reason of its communicability, may be considered dangerous to man, efforts are made to learn all facts relative to such outbreaks. The matter is reported to the State Live Stock Sanitary Commission, and the attention of the health officials of the locality where the disease is reported present is called to the fact of its reported prevalence, and they are requested to take immediate measures for the prevention of its spread, by establishing and maintaining quarantine over the diseased animals, until relieved by the State Live Stock Sanitary Commission.

During the year 1905, outbreaks of tuberculosis and actinomycosis (lumpy jaw) among cattle; glanders (farcy) in horses; and rabies (hydrophobia) in various animals, were reported to this office from various parts of the State, a brief history of the most important of which follows:

TUBERCULOSIS IN CATTLE IN MICHIGAN IN 1905.

During the year 1905, tuberculosis, or suspected tuberculosis, in cattle, was reported from eight localities in Michigan.

Several communications were received at this office relative to the suspected cases, and instructions were sent from this office in regard to the isolation of the cattle and to the disposal of the milk from these animals.

The following extract from a letter from this office relative to one of the outbreaks in 1905, will serve to show the nature of the action usually taken by this Department upon the receipt of information relative to tuberculosis in cattle:

"Your letter of February 7, relative to a cow which you have and which, I infer, you are not sure is perfectly healthy, is before me. If the cow is not perfectly healthy, the milk should not be used or sold until it has been determined that there is no disease about the cow which would render the milk unfit for use. If you have any suspicion that the cow has tuberculosis, it is your duty under the law to immediately report the same to some member of the State Live Stock Sanitary Commission, or to your local board of health or some member thereof. The law also requires the local board of health to immediately investigate, and, if such investigation shows a reasonable probability that such animal is affected with a contagious or infectious disease, to establish such temporary quarantine as may be necessary to prevent the spread of the disease and report all action taken to the State Live Stock Sanitary Commission or some member thereof, and the local board of health shall act until relieved by the Commission or some member thereof."

ACTINOMYCOSIS (LUMPY JAW) IN MICHIGAN IN 1905.

During the year 1905, information relative to four outbreaks of actinomycosis (lumpy jaw) in cattle in Michigan were received at this office.

The following letter is a copy of one written to Hon. H. H. Hinds, President of the State Live Stock Sanitary Commission, relative to one outbreak:

"There is, in this township (Summerfield) a diseased cow. She has, I believe, what is commonly called lump jaw. At any rate it is something that should be looked after. The owner of this cow sells both butter and milk, as well as using it themselves, and besides the cow is starving. I write to ask you what can be done with her and what is my duty as health officer."

In reply to this letter the Secretary of this Board wrote as follows:

"Owing to incorrect address, your letter to Hon. H. H. Hinds, President of the Live Stock Sanitary Commission, Stanton, Michigan, has come to my notice, before reaching its proper destination. To prevent further delay, permit me to call your attention to the following course, as provided by law.

"The local health board, or you as its executive officer, are required to establish such temporary quarantine as may be necessary to prevent the spread of the disease, and report all action taken to the commission or to some member thereof; and the acts of local boards of health establishing temporary quarantine shall have the same force and effect as though established by the commission itself, until such time as the commission may take charge of the case or cases, and relieve the local board of health. [Section 5632, Compiled Laws of 1897.]

"Therefore, you should at once investigate and isolate the diseased cow, prevent the products therefrom from being sold, since such can carry the disease to man, and report all action taken to the commission, until relieved by the same."

"Have the kindness to report to this office relative to the communication of the disease to any person, as far as you can ascertain."

May 22, 1905, a letter from the health officer of La Salle township relative to this same case of lumpy jaw was received at this office, stating that the cow had been under quarantine by the authority of the State Live Stock Sanitary Commission, but had recently been removed from Summerfield township to La Salle township.

GLANDERS (FARCY) IN HORSES IN MICHIGAN IN 1905.

During the year 1905, there were reported three outbreaks of suspected glanders (farey), in horses, in three localities in Michigan.

The following is a sample of the advice given by this Department upon the receipt of information relative to an outbreak of glanders:

"Relative to glanders, the case should at once be reported to the State Live Stock Sanitary Commission, and the health officer of the jurisdiction in which the case occurs is expected to take charge of the case until some member of the commission relieves him. Meanwhile it is very important, since the disease is dangerous to man and to animals, to isolate the animal supposed to be diseased, and to take every precaution until the commission or some member thereof shall relieve the local board of health of the charge."

RABIES (HYDROPHOBIA) IN MICHIGAN IN 1905.

During the year 1905, there were reported to this office seven outbreaks of rabies in the same number of localities in Michigan.

Several dogs, sheep and cattle were bitten, and one horse died from hydrophobia. Two persons were reported as having been bitten and one of them was reported as having died from hydrophobia. One person bitten was sent to the Pasteur Institute, at Ann Arbor, for treatment. In two localities muzzling of all dogs at large was ordered.

The following general instructions have been sent to health officers, and other interested persons, in localities where rabies was reported present

MUZZLE ALL DOGS AT LARGE.

The State Board of Health advises every local board of health in Michigan to immediately make and publish regulations ordering the muzzling of all dogs at large and the killing of all unmuzzled dogs found at large, and to make provision for the prompt and effective execution of such regulations.

Local boards of health have full power to make such regulations which, when published, have the force of law, the violation of which is a misdemeanor. This power or authority is implied, and is also given by statute in Michigan, in townships by Sections 4412 and 4413, Compiled Laws of Michigan, 1897; and these sections are made to apply in cities and villages by Sec. 4459, excepting in cases where the charters of such cities and villages contain provisions inconsistent therewith.

The section of law specifying the manner of the publication is as follows:

"Sec. 4416. Notice shall be given by the board of health of all regulations made by them, by publishing the same in some newspaper of the township, if there be one published therein, and if not, then by posting them up in five public places in such township; and such notice of said regulations shall be deemed legal notice to all persons."

The following form is recommended:

OFFICIAL PUBLIC NOTICE BY THE BOARD OF HEALTH. REGULATIONS FOR THE PREVENTION OF HYDROPHOBIA, BY THE RESTRICTION OF RABIES.

WHEREAS, Rabies is widely disseminated and is epidemic in Michigan; and

WHEREAS, The State Board of Health has recommended that municipal and township authorities order the muzzling of all dogs at large, and make and publish regulations to that effect;

Resolved, That the local board of health of the township [city or village] of.....
....., county of....., State of Michigan,
hereby makes and publishes the following regulation:

All dogs, male or female, not effectually muzzled, running at large on any street, alley or public grounds, or private premises, not the premises of the owner or keeper thereof, may be killed by any person; and it shall be the duty of every constable [policeman, or other peace officer] of the said township [city, or village] and he is hereby ordered to kill any and all such dogs.

[Name of place and date.]

Attest.

.....
Clerk of the Board of Health

MAD DOGS.—WHAT TO DO WITH AN ANIMAL SUPPOSED TO BE RABID.

If it is certain that the supposed rabid animal has not bitten any person or animal, it may properly be killed and buried where no other animal may gain access to it.

Whenever a person has been bitten by a dog which there is reason to believe is infected with rabies, or a part of his body of which the skin is in any way broken is brought in contact with saliva from such dog, he or she should promptly go or be sent to a Pasteur Institute for treatment until it is determined whether or not the dog was so infected.

When an animal has been bitten by a dog supposed to be rabid (commonly said to be "mad" or to have "hydrophobia"), it is desirable, and when a person has been so bitten it is important that the fact be established whether or not the dog is rabid. Because, if it is known to be rabid, there may then be time for the person bitten to undergo preventive inoculation or other treatment; while if the dog is proved not to have had rabies such trouble may be prevented, as also the extremely painful anxiety which otherwise would long continue. It is now possible to learn whether or not an animal is rabid.

If practicable, without danger of some person being bitten, the dog or other animal supposed to have rabies should not be killed, but be very securely confined, in such manner that it is not possible for it to bite any person or animal. *If the dog is rabid it will die within eight days.* If it does not, it is proof that it was not rabid. If it dies, the animal was probably rabid, and in that event, as also if the animal has been killed, the upper portion of the spinal cord and adjacent part of brain should be placed in a sterilized bottle

with a glass stopper, the bottle then filled with twenty per cent solution of pure glycerine, and the whole sent by express or special messenger to the Director of the State Laboratory of Hygiene, Ann Arbor, with request for an immediate biological test for rabies, and a report of the result. Such investigations are made there at cost.

A person bitten by an animal supposed to be rabid should very promptly consult a physician; and without waiting for the physician should employ all practicable means for dislodging from the wound any germs of virus which may have entered there; washing the wound freely with boiled water, and by means of a syringe if possible.

Rabies is a "disease dangerous to the public health" and as such should be promptly reported to the health officer, and promptly restricted by him in accordance with Act 137, Laws of 1883, and other laws relating to the public health. If the disease occurs in an animal, the health officer or local board should also, in compliance with Sections 5 and 6, Act No. 125, Laws of 1889 (C. L. 1897, Sections 5631 and 5632), promptly report the fact to the State Live Stock Commission,—the guardians of the safety of animals; but under no circumstances should the local health authorities fail to guard the public health and life from this fearful disease.

Animals bitten by a supposed rabid dog should be promptly isolated by the local board of health and kept thus until the State Live Stock Commission shall have been informed of the facts and takes charge of the animal or animals, thereby relieving the local board of health. This is required by Section 6, Act 125, Laws of 1899 (Section 5632, C. L. 1897). Whether in man or animal, the disease should be promptly reported to the State Board of Health.

TYROTOXICON POISONING IN MICHIGAN IN 1905.

In July, 1905, sixteen persons were reported to have suffered from tyrotoxon poisoning in the township of Barry, Barry county, from eating cheese sold at one of the stores. The grocer was notified by the local health officer to stop the sale of the cheese.

ALLEGED NUISANCES IN MICHIGAN IN 1905.

During the year 1905, communications relative to ninety-three alleged nuisances in Michigan were received at the office of the State Board of Health. The causes to which the alleged nuisances mentioned in these communications were attributed, may be classified as follows:

Filthy pig pens, 10; stagnant water, 9; barnyard and manure heaps, 8; insanitary drains, 8; slaughtering and slaughter houses, 7; insufficiently buried animals or dead animals on ground, 6; insanitary surroundings, 5; refuse dumped on ground, 4; pulp from sugar beet factories, 3; refuse from creameries, 3; sewage from kitchen and privy, 3; water closets, 3; privy vaults, 3; cesspools, 3; pomace from cider mills, 2; refuse from starch factory, 1; drainage from salting station, 1; odor from fertilizer, 1; odor from chemical works, 1; odor from fish bait factory, 1; fish offal left on dock, 1; scrapings from tannery left on ground, 1; refuse from pickle factory, 1; well water causing typhoid fever, 1; neglected cattle yard, 1; flooding of lake, 1; meat market, 1; diseased dead animals fed to hogs, 1; mulching of berry bushes, 1; bees kept in village, 1; and cedar bark in lake, 1.

Whenever complaint of an alleged nuisance is received at this office, the president of the local board of health whose duty it is to act, is usually

informed of the nature of the nuisance, and is requested to investigate the same. At the same time the sections of law, and pamphlet publications of this Board pertaining to nuisances and to the duties of local boards of health relative thereto, are sent to him and also to the person making complaint. Two regular forms of letters are used for this purpose. The first is sent to the person making complaint of the nuisance, the other is sent to the president of the board of health of the locality where the nuisance is reported to exist.

In articles on alleged nuisances, published in previous annual reports of this Board, attention was called to the fact that a large proportion of the communications received at this office in regard to alleged nuisances came from local health officers and other township, city and village officials asking for information relative to points of law concerning nuisances, or requesting advice as to their duties, or to the proper legal procedure necessary to effect the prevention or abatement of nuisances. The correspondence of 1905, shows a continued desire on the part of the local health officials for advice and cooperation of this Board, which has been freely and cheerfully given, and it is believed with results beneficial to the public health.

The State Board of Health has no authority to enforce or order the abatement of a nuisance. Its powers in this respect are advisory. And while the board is willing to render such advice as it may be able to give on any subject, it is often the case in regard to nuisances, that prosecuting attorneys or other lawyers on the ground and acquainted with the facts, are in better position to give legal advice than is the office of the State Board of Health. The Secretary of the State Board of Health is always glad to learn of the efforts of local boards to abate nuisances, and what success attends those efforts, and solicits correspondence upon this subject. However, the State Board of Health cannot undertake to do for local boards that which the law has so well provided for their doing for themselves. In showing them how they can help themselves it really does more for them than to do their work; for when the local board has mastered the situation and removed a nuisance, it has secured a vantage ground which a distant authority could not so well secure and hold.

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